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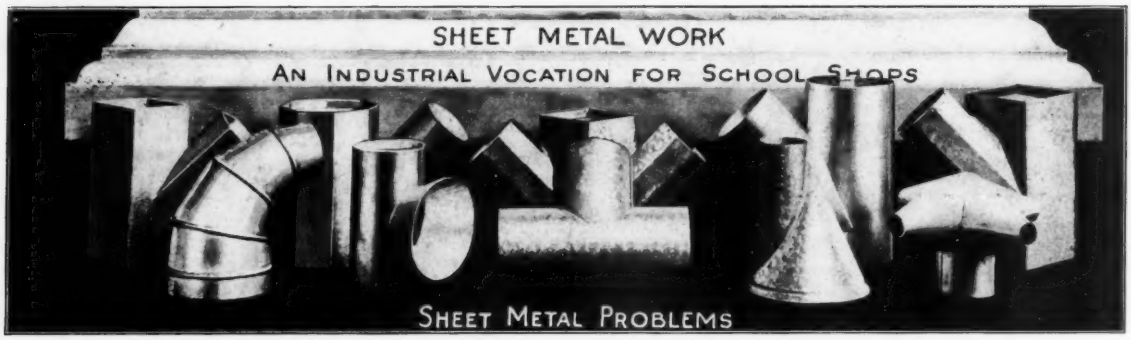

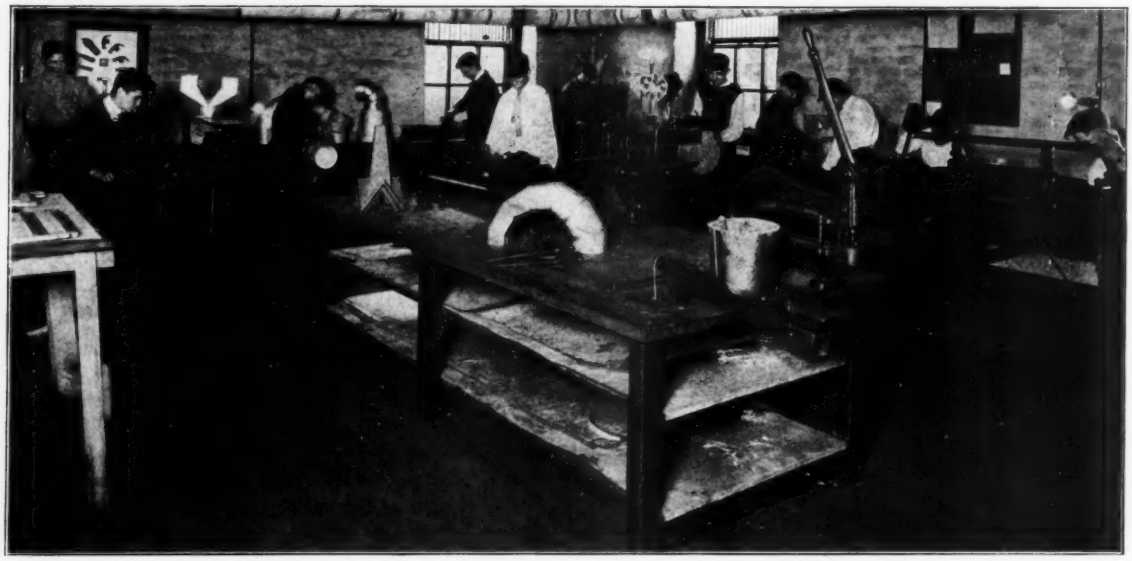

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INDUSTRIAL-ARTS MAGAZINE

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FIRST AID TO THE INEXPERIENCED—IX

PURPOSE, TERMINOLOGY, AND PSYCHOLOGICAL BASIS OF INDUSTRIAL WORK

S. J. Vaughn

A GREAT confusion seems still to exist in the terminology of vocational and industrial work and in those forms of work which are commonly regarded as preparatory or related to the field of vocational education. Manual training, industrial arts, practical arts, prevocational work and vocational education are used interchangeably by a great many people. Not only is there confusion in terminology, but there is far too much haziness with reference to the character of work to be expected in the various lines and with reference to the significance and bearing of such work in our educational philosophy.

Mere terminology is of itself not of overshadowing importance, but it is vastly important that teachers of special subjects shall have a common body of knowledge concerning such subjects and that they shall be able to make clear-cut and well defined distinctions, where distinctions exist, among the various phases of the work which these subjects cover. On the other hand, only confusion results when artificial distinctions are made where none exists. Endless discussions and misunderstandings and delays could have been avoided by the simple expediency of definition. Criticism could have been forestalled by illuminating statements of purpose.

Not long ago some visitors in a certain city were asked to visit a "trade school." The visitors went into the magnificent building with its elaborate equipment only to find some ordinary manual training work in progress. Not one of the students had any notion that he was pursuing courses which he proposed to follow as his life's work. No students were found who had even remote intentions of following trades. The teachers were conscious that the instruction being given did not lead in any adequate way to trade knowledge and skill; and furthermore, they were frankly of the opinion that the giving of trade courses under the conditions would be neither possible nor desirable. No claim is made, of course, that this is a typical situation. The case is cited to emphasize the point that lack of correct terminology leads to confusion.

Vocational and Industrial Education—Distinction.

In the very first place, a distinction should be made between vocational education and industrial education. Vocational education embraces every form of education and training whose controlling purpose is to fit for profitable employment. In its broad sense, therefore, it includes education for the professions, for commercial occupations, for agricultural pursuits, for home making, for trade and industrial work, etc. The very much narrower term, industrial education, may be used to designate vocational work in the trade and manufacturing fields, as well as all those various phases of educational work which make use of the materials, tools, and methods of industry for educational purposes, whether for general or specific ends.

As a general proposition it may be said that the character of industrial work (used as a general term like mathematics to cover a wide range of activities) is determined in any particular case by its purpose and the length of time at the disposal of the schools in which to accomplish such purpose.

The Three Avenues.

The purposes of the various phases of industrial work for educational ends rest, of course, upon psychological foundations. Reason is the distinctively human capacity. The animal jumps immediately and instinctively from impulse to action without the intervention of reason, without the cautioning influence of discrimination and judgment. The extent, therefore, to which reason intervenes between impulses and actions is both a guide and a measure for educational procedure. In general, non-technical language, it may be said that there are but three avenues from the realm of impressions, sensations, or impulses to the realm of action or conduct, namely, the avenue of instinct where the reaction is without reason; the avenue of the intellect and reason where the reaction follows definitely thought out conclusions; and the avenue of habitual or automatic responses.

The infantile or early childhood reactions are largely of the instinctive type. Such responses grow

into and blend with those of the second type which are initiated thru the avenue of intellect and reason. Once a reaction has occurred in response to reason, it tends thru repetition to eliminate reason and to fix itself as habit or automatic reaction. Thus the holding of a pen is at first a distressingly conscious and laborious effort. Later, however, as mere habit, the same act is performed with facility and comfort and with almost no appeal whatever to the reason or even to consciousness. This tendency of the mind to drop familiar reactions from consciousness and to relegate them to the realm of automatic responses makes possible the high degrees of skill so common in all the various fields of human effort. Thus it has been said, not quite accurately, that "skill is the vanishing point of education." Skill may be near the vanishing point of education in any particular reaction or control, but when this reaction has been given over to habit, the active mind tends immediately to busy itself with new problems and often to use the recently acquired habits to aid in the solution of the new problems. The same thing is true in all education. Every piece of knowledge or skill, the acquisition of which may be set up as a temporary end, when once acquired, becomes the means of attaining other ends.

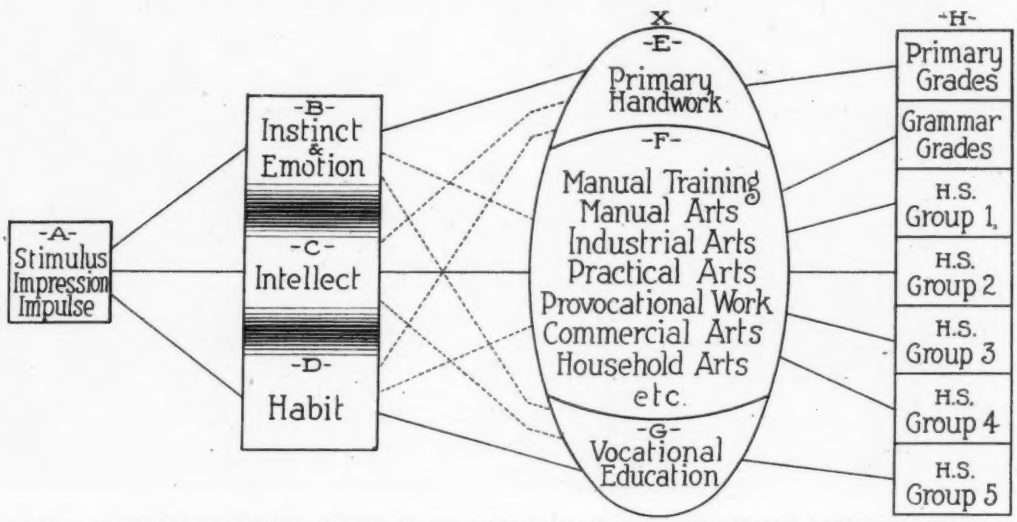


FIG. 1. PSYCHOLOGICAL BASIS AND RELATIONS OF MANUAL ARTS, INDUSTRIAL AND VOCATIONAL WORK.

Explanation of Diagram.

In Figure 1, an attempt has been made to express graphically the psychological basis and relations of the various forms of manual, industrial, and vocational work. It is manifestly impossible, of course, for the mind to be accurately diagrammed and to be divided off into well defined areas and realms with immutable boundaries. The diagram is offered, therefore, merely as an imperfect, mechanical device for the purpose of emphasizing certain relational ideas. Major relations are shown by solid lines. Minor relations, connections, or points of emphasis are shown by broken lines.

Every act has its origin in impulse, stimulus, or impression. *A* in Fig. 1 is the realm of impulse, stimulus, or impression. *B* is the realm of instinct, thru which lies the avenue from impression or stimulus to those immediate responses which Thorndike calls "unlearned." The third area, represented by *C*, is the realm of intellect, thought, reason, thru which lies the avenue from impulse to rational conduct—the seat of purpose, information, and knowledge of principles. *D* is the realm of habit, thru which runs the avenue from stimulus to automatic reaction. In addition to the specific skills designed for certain work and acquired by definite training, it contains the residue or by-product of realms *B* and *C*. That is to say that both instinctive and reasoned action may result in habit.

It will be noted that realm *C* shades off and merges into realm *B* on the one side and realm *D* on the other. In other words, an act may originate in instinct and yet be raised into the intellectual realm and consciously cultivated and finally in its improved form be dropped into the realm of habitual or automatic reactions. Or a reaction may be a deliberate and reasoned response belonging to realm *C*, but upon frequent repetition it requires less and less of conscious attention until finally it becomes almost a purely habitual performance belonging to realm *D*. Or by the deliberate act of the will an action which has become almost purely automatic may be raised again into consciousness, or realm *C*.

The large elliptical area X is the general field of action or conduct in so far as it is related to manual, industrial, and vocational activities. *E*, *F*, and *G* constitute the divisions of this general field of conduct. *E* includes those elementary activities of childhood which are grouped about instincts, such as curiosity, imitation, etc., which call to their aid in an ever enlarging degree, definite intellectual responses, and which gradually merge into types of work which have their origin and their completion in the intellectual realm. As the child advances, therefore, both in years and in experience, the realm of instinct recedes and the child

enters more fully into the realm of rational life where acts are inspired by conscious need or desire, controlled by purpose, and executed by reason.

F is the realm of reasoned responses and includes all forms of activities whose major emphasis is upon the intellectual phases of the work, and upon experiences guided by reason, with incidental manipulative skill as an important and necessary, but minor, consideration. Activities for general experiences and education, for contact with the materials and methods of industry to give an appreciation of the significance and problems of the industrial world, and for guidance purposes for future education and work—all such activities lie within realm *F*, as indicated in the illustration.

Area *G* is the realm of conduct which is thoroly grounded in habit—the realm of skillful performance..

Range of Motor Experiences.

It would be interesting to trace the total motor experiences of an individual from the early instinctive reactions thru the manual and industrial activities of the grammar and high schools to his completed training as a skilled tradesman. Such experiences begin with those instinctive reactions without plan or purpose, merging over rapidly into the realm of thought and purpose but still retaining a large element of physical experience and sense impression. They gradually rise thru the upper grades and high school to the point where the technical or theoretical phase dominate, where the practical manipulation of tools and materials assumes the character and function of the laboratory, and where manipulative effort is not confined to one particular line but is made to cover a moderately wide range of activities, such as machine shop practice, carpentry, forging, pattern making, etc.

Beyond this point, the vocational motive dominates. The field is narrowed to the one trade or pursuit which the student wishes to follow. The controlling purpose of the work becomes the immediate fitting of the student for useful or profitable employment in a recognized occupation. Specialized manipulative skill takes on a new significance and receives the major emphasis.

Thus it is that the motor experiences of such an individual as described above begin in the realm of instinct and end in the realm of habit, running the whole gamut of intellectual control from a minimum thru the maxium back to the minimum again.

It must not be assumed from this discussion that vocational work requires no intelligence or that industrial arts work requires no skill. The whole question is a matter of emphasis and purpose as related to shop work and the shop methods of procedure.

Manual Training and Industrial Arts Not Vocational.

All are agreed now that manual training, manual arts, industrial arts, practical arts, etc., which begin in the elementary grades and continue thru high school, or at least thru two years of it, have not, in the main, produced definitely vocational skill. Indeed, no such purpose has ever been held by any considerable percentage of those who have had either the administration or the teaching of these subjects. True, the early teachers of manual training and some of the later ones looked upon skill of hand as the main end of the work, but they did not conceive it to be training for definite vocations. They held to the doctrine of the transfer of skills and hence laid great store by the acquisition of skill of hand, but they had no notion that the making of carpenters and machinists and blacksmiths was the primary purpose of their work.

Even if the contention had been made that the purpose of manual training was to produce skilled mechanics, there were numerous reasons why such an ambition could not possibly have been realized. In the first place, not a sufficient amount of time has been allowed for the shop work to make possible the attainment of vocational standards. In the second place, the character of the work has not been such as to train for definite vocations. And in the third place, the teachers themselves have not usually had sufficient trade experience to enable them to give the work a distinctly vocational character.

The school people, therefore, have quite consistently disclaimed any intention of teaching vocations in the manual training, manual arts, industrial arts, and practical arts classes. The general public, however, has been quite uniformly impressed with the students' ability " to make things," the not infrequent instances of manual training boys engaging successfully in pursuits requiring more or less skill, and with the quite common belief on the part of the boys that they were getting training which would be commercially valuable. The public mind has thus far not been made conscious of its own inconsistency in expecting a few hours per month for two or three years in the manual training shops to make tradesmen of young boys, when the same boys take grammar and arithmetic and spelling and penmanship five times a week for many more years than they take manual training, without exciting anybody's expectation or even suspicion that they know very much about them or that they can use them with facility.

Groups of High School Students.

Having thus classified the various phases of industrial, or handwork, with reference to the mental significance of the activities involved, let us now inquire as to the various groups of pupils that may be found in the high schools and as to the value and kinds of industrial work which fits their purposes. What are their particular ambitions, their needs, and the kinds of industrial work adapted to their ambitions and their needs?

In the average American high school, the following groups of pupils are quite clearly discernible, especially among the boys. Among the girls there are other groups more or less clearly defined. It is not here contended that these groups constitute a fixed classification.

Indeed there are constantly occurring changes from one group to another. There undoubtedly are students who do not fit clearly into any one group, but in the main these five groups would seem to include almost the total high school population. Fig. 1, *H*, shows the various groups of the school field and their relations to the general realm of activities, or conduct.

Group 1. Those students who are pursuing "college preparatory" courses with the intention of entering colleges of liberal arts and science, or colleges of law, medicine, theology, etc.

Group 2. Those students who are planning to enter other professional colleges like mechanical engineering or architecture.

Group 3. Those students who propose to enter trade or industrial work but who have not made up their minds what particular trades to follow. This group will, in all probability, drop out before finishing high school.

Group 4. Those who have made no plans and who, consequently, are wholly at sea as to their future work.

Group 5. Those students who have definitely decided to enter certain trades as soon as they are permitted to leave school and who desire all the training they can get in early preparation for such trades.

Types of Industrial Work for Various Groups.

With Group 1, the vocational motive is very remote, even if it is at all defined. This is the traditional group, the typical "classical high school" group. It is perfectly apparent, therefore, that the students of Group 1 will not enter the ordinary manipulative phases of vocational work, and hence will have no direct need for definite manipulative skill, except in so far as such skill might be an aid to appreciation in various fields with which they must come in contact. But from the broadly democratic and social point of view, Group 1 are probably in as great need of at least a casual contact with industrial, commercial, and agricultural phases of education as any other group.

These people must live in a society with other and much larger groups whose absorbing ideas and interests are in the industrial fields. According to Dr. Dewey, two of the fundamental necessities in a democratic society are, first, for the various groups to possess a fund of ideas in common; and, second, for the groups to maintain avenues for the spread of ideas from one group to another. Furthermore, such people as constitute Group 1 must build houses, employ labor, buy furniture, pictures, tapestries, and other products of industry, and come in contact in various and sundry ways with the trade, commercial, and industrial world. Reasonable preparation for such contact could be acquired by pursuing high school courses in the practical lines of commercial, agricultural, household, and industrial arts. Such courses involve a maximum amount of industrial knowledge combined with concrete experiences which furnish a basis for appreciation and which result in a degree of manipulative skill. In such an instance, therefore, the skill acquired would be incidental—a necessary result of certain information tested in the laboratory of experience. This type of work would fall clearly in the intellectual realm *C*, and would be pursued for purposes of intelligent consumption and of appreciation of problems, conditions, methods, and products of industry, commerce, agriculture, homemaking, etc.

In the case of the second group, the professional vocation, such as electrical engineering or architecture, has been definitely decided upon. For such students there would still seem to be but scant reason for attempting to produce a high degree of manipulative skill in their high school shop work. As high a degree of skill as can be produced in the time devoted to purely manipulative processes should be produced; but the time devoted to such work should be relatively small. Certain it is that the skill thus acquired by such students is never used in the tradesman sense.

The demand would still be in this group, as in the first group, for intelligent consumption, for appreciation, type experience, in both manipulation and organization, and a limited amount of manipulative skill for purposes of the future college courses, with the added element of greater technical knowledge and understanding. Thus the shops for the manipulative work would be recognized as laboratories wherein demonstrations and experimentations are carried on in illustration of the technical principles formulated and studied in the theoretical, or technical, phases of the work. It would therefore seem that a considerable proportion of the time now spent in tool and machine manipulation in the technical high schools in an attempt to acquire mere manipulative technique, might to a much greater advantage be devoted to something else.

Those who constitute Group 3, or those who must at an early date go to work in some vocation, but who do not know what line they wish to select, much less the line of work in which they might find some chance of success, are entitled to definite and positive and intensive assistance from the schools. They might at least expect to receive some guidance and advice in selecting an occupation and a modicum of training in the direction of that occupation. Such aid should be offered in a group of "finding" courses, which have been loosely and inappropriately called "prevocational." I have always had a quarrel with the term "prevocational" because of its all-inclusive indefiniteness. *Provocational* —"a call to" the vocations—would be meaningful and exact in designating those finding courses whose purpose is to acquaint the student with the general character of several different vocations and to aid in the selection of one to follow.

In the early part of the high school, or in the junior high school, therefore, such students as those mentioned in Group 3 can do no better than to pursue

for a part of their work, brief courses in the technical content and practice of such important vocations as carpentry, electrical work, machine shop practice, printing, office practice, drafting, etc.

Since the finding, or provocational, courses are for guidance purposes, and cannot in any event lead to more than one occupation for an individual, and conceivably to no occupation for some individuals, it is but reasonable that the emphasis should be placed on the informational, or technical content side, with but moderate stress on the accumulation of definite skill in the several occupations. Therefore, this type of work, like that of the two preceding groups, belongs to the *C* realm of Fig. 1, with its major emphasis on the intellectual content and experiences, and with but relatively minor attention to manipulative skill. However, the manipulative phase of the work should be emphasized more in the same length of time in the provocational courses for Group 3 than in the work for Groups 1 and 2. Such courses may, furthermore, demand a different organization from that of the other groups.

Those students who belong to the "don't know," or the wholly undecided Group 4, can do no better than to follow the same procedure marked out for those in Group 3. By taking the finding, or provocational, courses of the junior high school, they either discover something that enlists their interest, or they definitely eliminate the entire trade group of occupations from consideration and turn their attention toward the professional fields. In such cases, however, the provocational courses would not only have served the purposes of guidance, but they would likewise have given the students that fund of general information and types of experience that are as valuable from the standpoint of general education as any other work which the high school offers. It is a common occurrence in these courses for students to develop such interests as will lead them to shift to such other courses as will prepare them for liberal arts or engineering colleges.

Group 5 have definitely determined upon certain vocations which they propose to enter as early as possible. They desire, therefore, to take such training as the high school offers in preparation for such work as carpentry, printing, or automobile repairing. In this case, the problem is a perfectly definite one. They demand the maximum of marketable skill in a minimum of time. The conditions are fixed. The students are going to leave school in a certain length of time. They are going into definite wage-earning occupations. They ask the schools to furnish them specific preparation. Whether it is right or wrong, wise or unwise, the law provides for such training. The major emphasis of such training is upon the manipulative phases of the work in acquiring as large a degree as possible of the tradesman's skill. Such an emphasis, therefore, places this type of work in realm *D*, Fig. 1, or the realm of habitual reactions.

When, thru the pressure of necessity or otherwise, one determines to enter with a minimum of preparation into a wage-earning occupation, the greatest stress will insure the largest entrance wage. This does not eliminate or ignore, or even underestimate the value of the technical or related subjects phase so esential to the individual and to the proper performance of his work. Neither does it imply that vocational work requires but little thought or reason. It simply means that in preparation for early entrance into a vocation, the major consideration is attention to certain definite, standard processes which by repetition become fixed in habit and thus leave the intellect comparatively free to deal with other matters, especially those that are intimately related to the processes whose mastery has been acquired.

Restricted Meaning of Vocational Education.

I have here used the term vocational education in its narrow sense in which it must be conceived for training purposes, namely, specific preparation for profitable employment. Ultimately, however, vocational education must compass all those activities, conditions, aptitudes, and accomplishments which contribute in any way to one's vocational efficiency. A worker's home surroundings and conditions might, and frequently do, materially alter his efficiency quite apart from considerations of definite vocational knowledge and skill. Certain extraneous habits or peculiarities of temperament and conduct often totally unfit highly intelligent and skilled workmen for the work for which they were trained. Vocational education, therefore, properly conceived, does not restrict itself to a minor segment of life, but should and must become an integral and vital part of the worker's life, about which all other activities and accomplishments will gather.

Purpose and Terminology of Non-Vocational Work.

Changes in terminology have not always by any means indicated changes in the content or character of the work which the terms were supposed to designate. In some cases, new terms have simply been attempts to improve upon the preceding ones in describing a little more accurately the work under consideration. In the whole realm of work that has come into the schools in the last forty years under the various names of manual training, industrial arts, vocational education, etc., there may be said to be not more than three fundamental, underlying ideas. These have eventually found expression in the types of work offered for the following three purposes:

1. Such shop work as will supply thru motor activities and concrete experiences a much needed element in general education, without regard to the future occupations of the pupils.

2. Work that will provide instruction and typical experiences in a variety of occupations, for purposes of guidance toward future work. It may very seriously be questioned whether this work need be essentially different from 1, except perhaps in point of organization.

3. Definite vocational preparation.

Manual training, manual arts, practical arts, and industrial arts are terms which have all been used to designate the work offered under the first purpose mentioned above.

Manual training was the original term under which the work was introduced in this country. It was an all-inclusive term used to designate any sort of hand training. All kinds of machinery were strictly taboo in the early days. Since this new education involved physical effort not demanded by any other sort of school work, it naturally became known by this characteristic and hence took its name from the form rather than from the content of the work. And, as a matter of fact, this name described rather accurately the early purpose and efforts in this new field. By right of priority, and of acquired significance, it is still in good standing as indicating the shop work in elementary and high schools designed for general educational purposes.

Manual arts, as a name, came into use as a substitute for *Manual training.* While it may not describe accurately the work which it was used to designate, its very introduction was evidence that the former term was too narrow to be descriptive. The term *manual arts* is an attempt to fit the name to the *content* rather than the *form* of the work. It indicates that those who brought it forward were thinking in terms of the ideas, materials, and practices of at least some of those trades, vocations, or "arts" in which people use the skill of their hands to do the work of the world. It is a perfectly definite recognition of the fact that the work thus attempted to be described belonged to the intellectual, or *C* realm, as shown in Fig. 1.

Practical arts is the term used quite generally thruout the eastern states to designate all those non-vocational lines of work for both boys and girls whose purpose is to give those contacts and experiences with the practical work of the world which are demanded by the ideals of general education. The term *practical arts,* therefore, includes industrial arts, agricultural arts, commercial arts, household arts, etc.

Industrial arts represents simply another attempt to name more appropriately the work which has been growing and enriching and broadening under the old names of *manual training* and *manual arts.* It broadens the conception of the work, in that it comprehends a great variety of activities that give insight and appreciation concerning all those "arts" that industry employs to do the work and produce the goods of the world. Like manual training, industrial arts may give a certain incidental skill unable in vocations, but this is not its purpose. Hence, the work shown as *industrial arts* includes the hand work and manual training of the elementary school and all those shop activities of the high school which constitute a part of a well-rounded course for general educational purposes, and not designed to prepare students for useful employment in recognized vocations.

Prevocational, or Provocational, work consists of such "try-out," or "finding," or "fore-taste" courses in a variety of vocations as will give a sufficient knowledge and experience upon which to base an intelligent choice of future vocation. Of course, all *industrial arts* work should, in a sense, result in such information and experience as would serve as a basis for judgment with reference to future occupations. Whether by organization and emphasis, general industrial arts courses may serve for the prevocational work demanded for certain special groups, especially in continuation classes, has not yet been fully determined. It seems probable, however, that the necessary brevity of *finding courses* and the rather definite decision on the part of prevocational students to follow *some* trade, demand a separately *organized* and conducted system of work. At any rate, the mass of information and experiences gained in the various try-out courses is equivalent, in all intents and purposes, to an equal amount of general educational work. Hence, all the try-out, or finding, work belongs to realm *C* where the emphasis is on intellectual content.

There was a time when the teachers of manual training, manual arts, industrial arts, etc., felt that their work was under suspicion and attack because it was not called vocational. Indeed, some such teachers adopted the vocational terminology in speaking of their work. Questions were seriously asked whether the development of vocational courses would not inevitably destroy those earlier, non-vocational courses.

When the matter is fully understood, it will be found that there is a definite and indispensable place in the educational program for all the various types of work which have been developed under these various names. The ideal arrangement will fit them into an organized scheme so that each type will play its perfectly definite and essential part in this supreme task of making education both democratic and universal.

EVEN if we accept the purely material viewpoint, a nation can ill afford to ignore the money value of an Art education which is a natural element of our industrial life. We must, in the near future, not only supply ourselves with textiles, furniture, carpets, wall papers, clothes and other necessities formerly furnished by Europe, but we shall, in many instances, be asked to supply South America, and even Europe itself, with these things. In matters of natural resources, mechanical skill and physical energy, we are ready. In matters of Art, we are crude, uncertain, and, worst of all, in many instances satisfied. Until there is a changed attitude as to what Art is, we cannot compete even in matters of commercial rivalry, for Art is as essential to man's perfect satisfaction as any material quality can be.—Frank Alvah Parsons.

THE CLASS PROJECT IN DESIGN—I

Edward J. Lake, Professor of Art and Design, University of Illinois

IN THE attempt to cultivate skill and judgment thru the study of design, as applied to the crafts and industries, the teacher must choose projects or problems that are possible with the class and which develop the ingenuity and ability of each member of the class.

Design is the arrangement of materials to serve a purpose. To design in a material, the pupil must know the peculiar limitations and possibilities of the material as adapted to the purpose.

No one teacher can teach design in many different materials or forms of construction, because no one teacher can acquire the experience peculiar to many different crafts and industries, but a teacher who is trained in the judgment of effects and, to a limited extent, in the handling of materials can devise and use projects that will give a valuable experience to the members of a class.

Projects which require as little ability in drawing or craftsmanship as any are the composition of forms in two tones of paper and ink, suitable for reproduction. There are many such projects, as initial letters, monograms, titles, letter-heads, tail-pieces, announcements, posters, etc. The one requirement for reproduction is that the inked areas, spots or lines be clear, definite, and in scale with the whole design, so that when reduced by photography and etched on a block, no parts of the design will be lost.

Such projects are desirable as class problems because they can be made the means of acquiring experience in the judgment of effects under definite conditions. One such project has been carried on with some degree of success, as indicated by the variety of results shown. These initials are a few of many such produced by a large class of students in college, who had little ability in drawing or painting. They were not prospective commercial designers or prospective designers of any sort, but were making a study of effects in design as a matter of appreciation. The same project could be offered with equal success to a high school class.

The materials used in this and similar projects were:

1. A block of paper 9″ x 12″ on which a T-square and triangles could be used.
2. A small T-square and triangles suitable for use on the block.
3. A lead pencil of H. B. grade and eraser.
4. Sheets of tracing paper 9″ x 12″.
5. A small tube of paste.
6. A bottle of India ink.
7. A Japanese brush.

The specifications for this problem were:

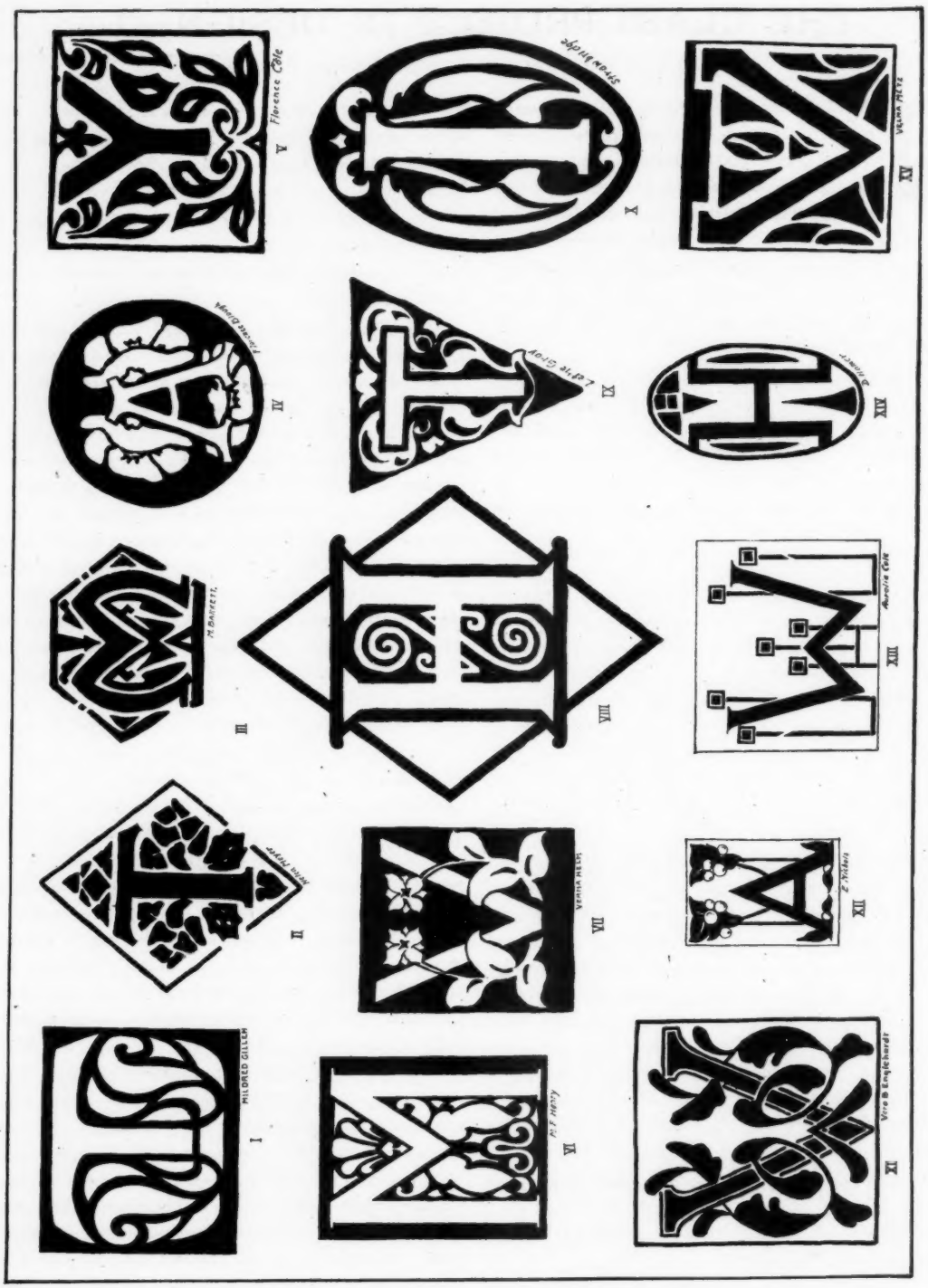
1. Place within a geometrical shape as a circle, square, rectangle, triangle, polygon or oval, one of the bisymmetric letters, as A, H, I, M, O, T, U, V, W, X, Y.
2. Apply to the letter and the enclosure any suitable decoration that will make of the design a most attractive initial letter *which is in symmetry over the vertical axis.*
3. Trace the final design with a brush and ink on a sheet of tracing paper which is mounted over the penciled study with a touch of paste at each corner.
4. Post the design for class inspection.

In a discussion of the best way to go about the problem the teacher was careful to suggest and not dictate the composition. Methods of executing symmetrical designs by folding paper on the vertical axis were shown. The method of holding a small square mirror on edge over the vertical axis and noting the effect of symmetry at different angles and positions of the mirror was also shown. Preliminary study of the composition in pencil was insisted upon. Various schemes were tried out by each pupil. Various decorative forms, such as flowers, sprays of leaves, geometrical and historical units were made available to the class for selection and adaptation.

It was emphasized that a literal drawing of a natural form is not desirable for decorative use. Conventional treatment of a natural form may be without interest. Nature offers many suggestions in line, form, tone, and color, but the designer must select for a purpose from these natural offerings. That design is most successful in which there is a place for every unit and every unit is in its place to the purpose. Balance is secured in this design by symmetry. Rhythm, or the transfer of interest, must be secured by arrangement of the units. Harmony of the units is essential, but variety is also necessary to interest.

The project offers the problem of adjusting the decorative units so that they will have something in common with the letter and the enclosure. Parts that are common with the letter and the enclosure are the vertical axis, the diagonals, and the corners of the enclosure. Note how in the examples shown the ornament unites the letter and enclosure by interests common to both. In numbers I, II, III, VI, IX, X, and XII the ornamentation radiates from the vertical axis and conforms in shape to the enclosure.

In numbers V and XV the ornament radiates from two corners of the enclosure and from the vertical axis. Perhaps the most unique design of the collection is number XIII, in which the ornament is in lines and forms similar to the enclosing rectangle, except that they are arranged to pronounce the upper extremities of the



DESIGNS MADE BY THE AUTHOR'S STUDENTS IN WORKING OUT PROBLEM.

letter. Number XIV is also a unique and simple design which harmonizes a rectangular letter with an oval enclosure by forms that have the curved and rectangular character of each.

In numbers VII and XI the ornamental is related to the letter by opposition of line and to the enclosure by conformity with the sides, and to both by symmetry over the vertical axis.

Perhaps the best general results of such a project is to lead the members of a class to the realization that beauty and propriety of design do not depend on using natural forms, but on the careful arrangement of lines, shapes, spots, and tones to give unity of effect with variety of interest.

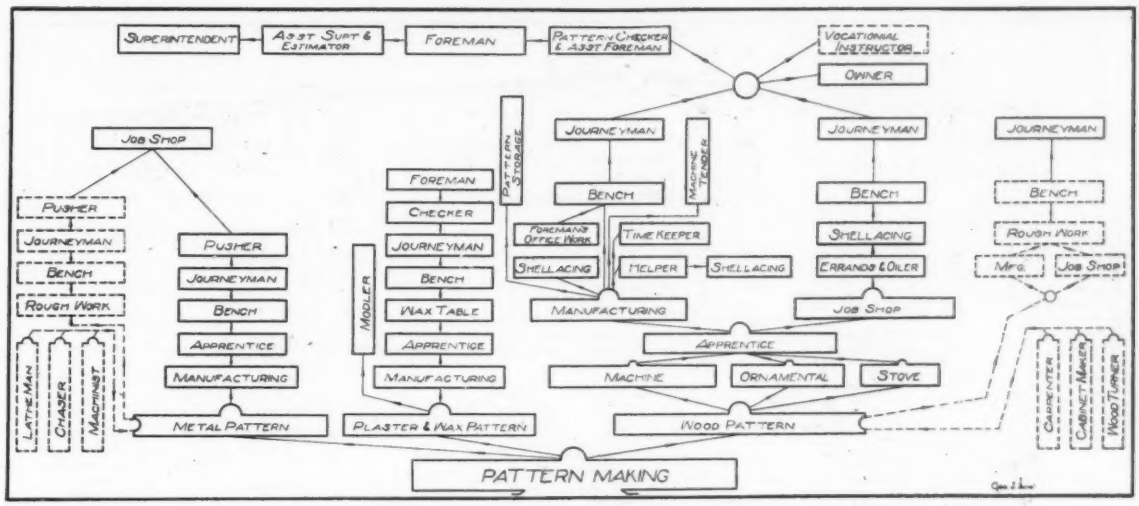


FIG. 1.

Graphic Aids in Vocational Teaching Analysis

Clyde A. Bowman, Director Department of Industrial Arts, the Stout Institute, Menomonie, Wisconsin

THE CONTINUOUS problem of the teacher, especially the vocational teacher, is the selection and teaching of parts of the trade or subject, i. e., to select and teach *less than the total trade or subject.* This selection is based on the kind of pupils, the kind of classes, the demands of the working environment of the pupils, and the possibilities of the leisure environment, etc.

The test of the professional skill of the teacher rests on his *clarity of vision* relative to the total possibilities of the trade or subject he is teaching, and skill and accuracy in the *selection and teaching* of that part of the total in the subject or trade, which the present particular group needs most. The teacher's professional skill is accordingly made up of three large factors: analysis, selection, and teaching. If any one of the three is lacking there is a corresponding drop in the professional skill. The training of new teachers and the improvement of teachers in service, accordingly calls for aid and guidance in the factor or factors of the three in which the teacher is weakest. The trade or subject analysis should, in producing results, throw light on the selection. The selection, in producing results, should in turn throw light on the teaching. If any one of the three is allowed to go off on a tangent the other two are affected. The teacher's continuous use of the results of subject and trade analysis is in selection. This selection is of parts of trade or subject content for particular classes or individuals, particular time allotments, particular equipment allowances, etc. It is more difficult for a person of broad experience in a given field to select and teach only a part of the total than it is to teach the total.

The major study of the vocational teacher in training is learning to teach. Following the "project method" as indicated in Bulletin No. 52, of the Federal Board for Vocational Education, this becomes his major subject, made up of the three elements as mentioned. As the institution designated by the Wisconsin State Board for Vocational Education for the training of trades and industries vocational teachers, the Stout Institute, Menomonie, Wisconsin, has a group of men taken directly from the trades under the direction of the Board for a two-year intensive teacher training course. In this article are indicated the steps they have taken and are taking in their analysis of the trades which they will teach, in the selection of what to teach from the results of this analysis, and its bearing on teaching.

Machinists, toolmakers, sheet metal workers, automobile mechanics, carpenters, machine woodworkers, and cabinet makers were represented in the first group in this teacher-training work. Each one early in his trade analysis saw what had been left out of his trade experience as he secured his apprentice training and journeyman experience in modern industry and asked for further shop training and experience in his trade *which presumably he had* when he came. This was immediately given him.

Formerly a "trade" meant that group of skills, information, and judgment possessed by a skilled workman in production or maintenance meeting some phase of the needs and demands of society. This meant in the early days a breadth of skill in the possession of each workman in a given trade sufficient to make the complete single item of production of the particular trade. "Trade" and "occupation" were synonymous. In the trend in industrial organization which brings us up to and into the present we find "trade" retained as a name,

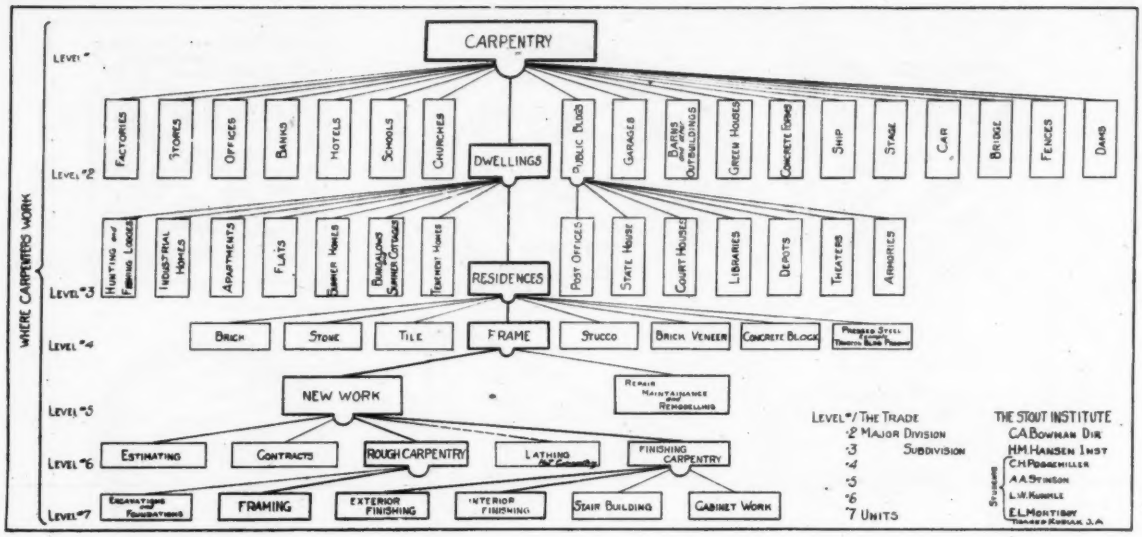


FIG. 2.

but as far as the individual is concerned it is the name of a group of occupations. In the carrying out of the work of the trade a number of individuals are involved. Each individual earns his living at an occupation which is one of a group of occupations which together may be called a trade. For the vocational teacher to be prepared to teach units of *trade* work as called for in part time and evening vocational school work, if he is to teach *any* units in his *trade,* he must know and be able to do the work of several "occupations." He will *know* and will be able to *do* more than is usually called for and paid for in an occupation in his trade.

The Instructor, the Man, and the Job by Allen, is used as the reference text in their trade-analysis work and is the basis for their data sheets. The data is arranged for use as indicated in Bulletin No. 52, of the Federal Board for Vocational Education, for the "project method." The writer gives direct acknowledgement to the following members of the faculty of the Industrial Arts Department, the Stout Institute, for technical checking and aid in student direction in the analysis of their respective lines of work.

R. L. Welch, Instructor in Forging and Sheet Metal Work.

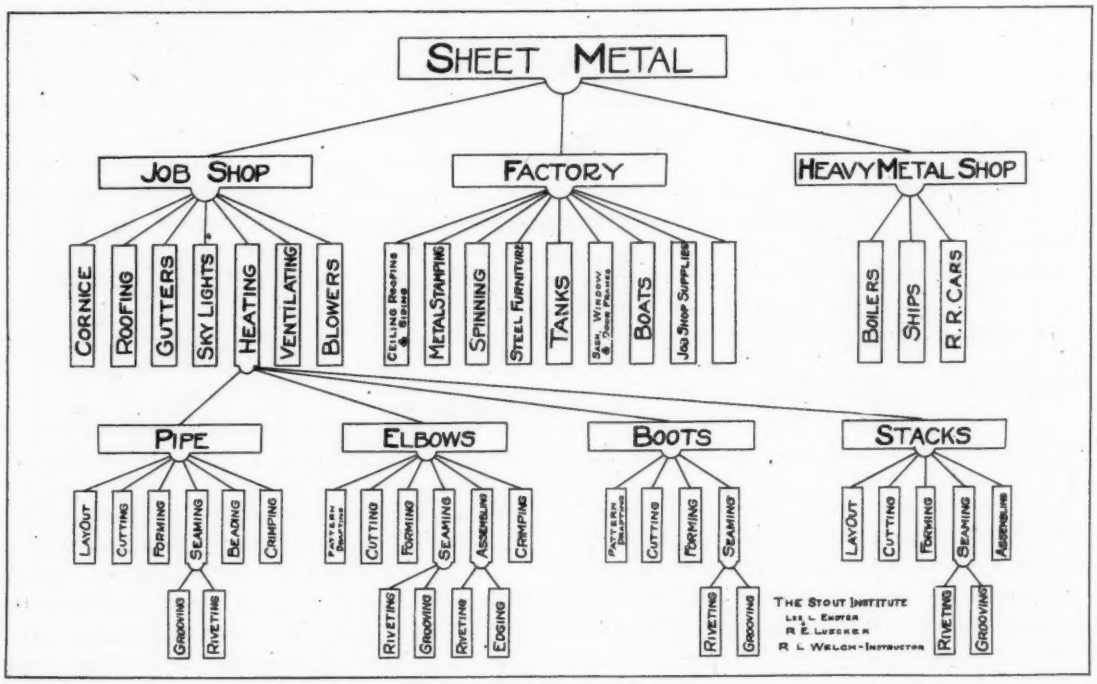


FIG. 3.

H. E. Milnes, Instructor in Pattern Making, Foundry, and Machine Shop.

H. M. Hansen, Instructor in Carpentry, Cabinet Making, and Millwork.

H. F. Good, Instructor in Auto Mechanics, and Electrical Work.

E. J. Neary, Instructor in Automobile Mechanics and Shop Mathematics.

J. E. Roy, Instructor in Bricklaying, Mechanical and Architectural Drawing.

The students in the Stout Institute, all journeymen in their trades, contributed work on the charts in their respective trades.

Pattern Making—George W. Nickel.

Carpentry—F. J. Finkbeiner, G. Mueller, W. L. Osmun.

Machine Shop—A. Weber, J. Herian, E. J. Couvillion, C. Strom.

Automobile Mechanics—Henry Houle, Ray F. Kranzusch.

Sheet Metal—Lee Endter.

In discussing and thinking on "trade analysis" there is sometimes an unconscious tendency to retain the meaning for the name "trade" which it carried formerly. In the analysis of present trades the vocational teacher training group at the Stout Institute began with a chart of *where people work* in the given trade. This uses the classifications based on what they do only so far as is necessary to show *where they work*. This chart will graphically indicate occupational fields. It will be used to focus analysis on and in certain occupational fields. It will be used to focus analysis on and in certain occupations as each is taken care of in the analysis of the total trade. The charts of Pattern Making (Fig. 1) and Carpentry (Fig. 2) are samples of charts of *where people work*.

In the chart of Pattern Making (Fig. 1) there are indicated the major divisions of the total field, metal pattern making, plaster and wax pattern making, and wood pattern making. These in turn are divided to show the fields *in which people work*, with some indication of probable travel from one field to another. Likewise in Carpentry (Fig. 2) the fields in which *people work* are indicated.

For the initial survey in starting analysis, selection is made of the probable work of an occupation. For example, from the pattern making chart the following line of occupational experience travel might be taken for analysis; pattern making,—wood patterns, machine —apprentice—manufacturing—then carrying the analysis thru both of the present avenues open, namely, the all-around training and the specialized training. These selections for analysis will usually approximate in breadth, the occupational experience possible and probable, for an individual in present industrial organization in the total group of occupations called a trade.

Following such an analysis and selection the chart

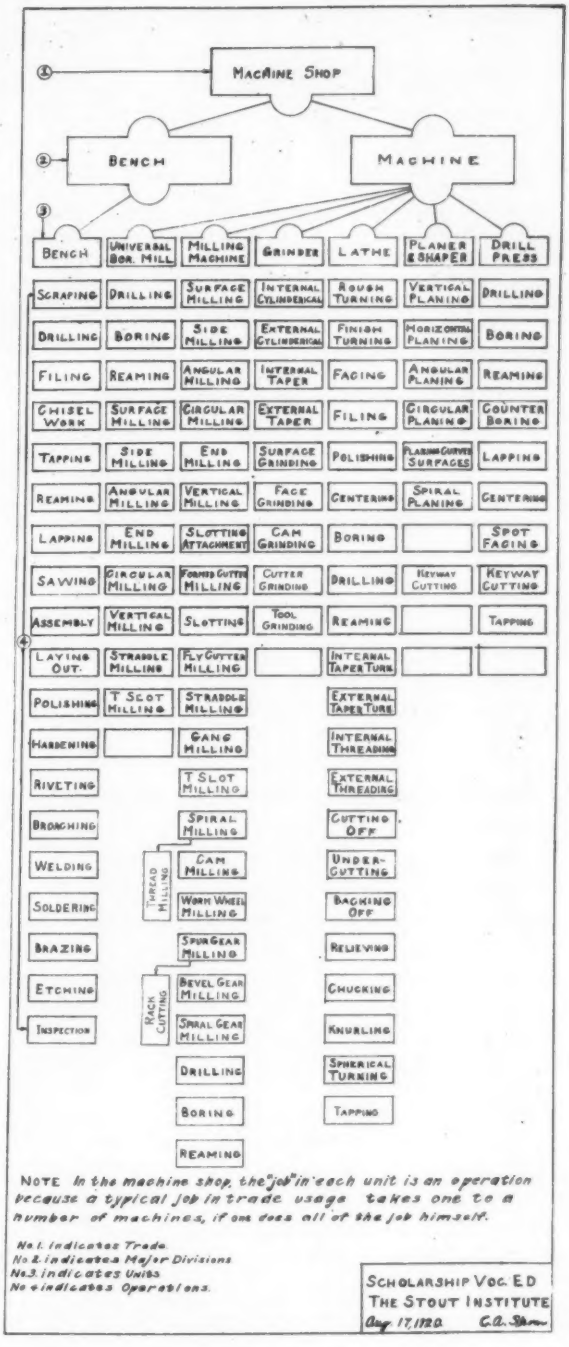


FIG. 4.

of *what people do* is worked thru. The charts of Automobile Mechanics (Fig. 7), Sheet Metal (Fig. 3), Machine Shop (Fig. 4), Bricklaying (Fig. 5), and Carpentry (Fig. 6), are examples of charts of *what people do*. In these the classification is worked out around which the material accumulated in trade analysis, subject analysis, job analysis, and topic analysis is arranged for teaching use. The chart (or, in the case of subject and topic analysis, the outline) should indicate:

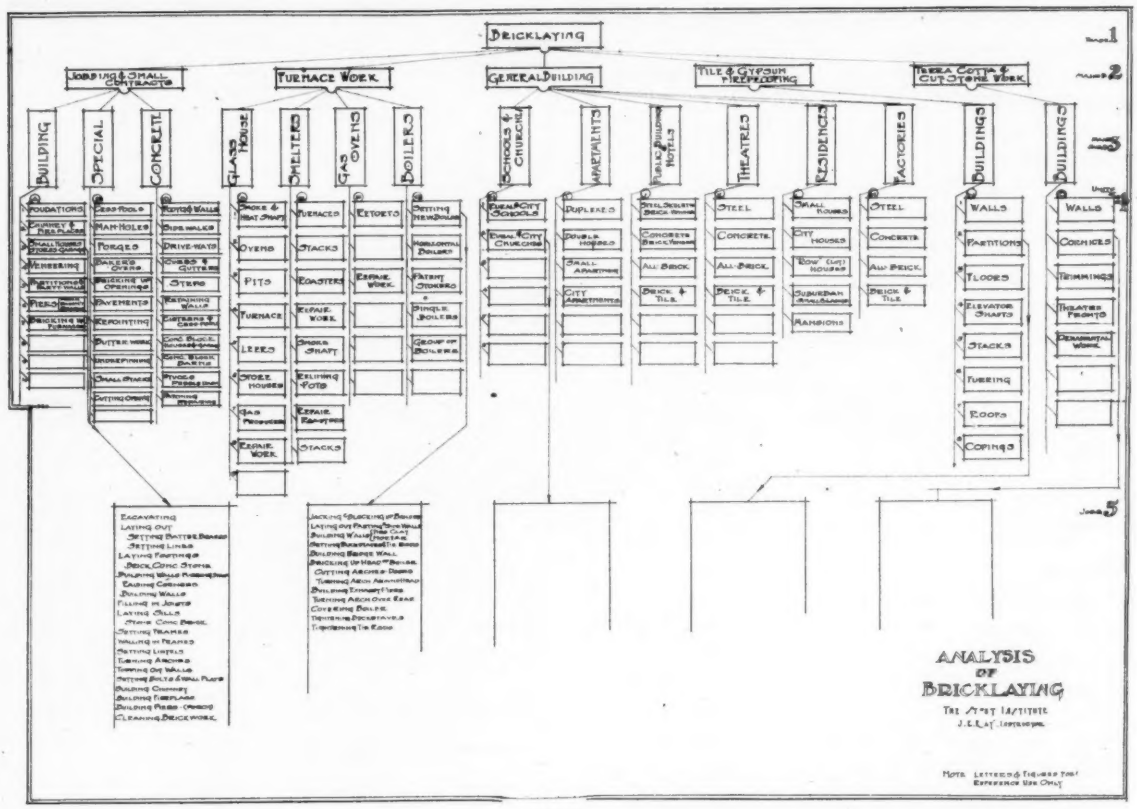


FIG. 5.

The major divisions of the subject or trade.

The major sub-divisions.

The level of sub-divisions which indicates the units (in trade analysis called "block" by Allen) in the field studied. A unit is that portion of the subject or trade in which the several parts to be studied and learned or done differ chiefly in difficulty rather than kind. Mastery of successive parts accordingly aids in mastery of the rest.

The level of sub-divisions which indicates the jobs or topics within the units.

The level of sub-divisions in and beyond which the elements are considered parts of some one of the topics or jobs and are not considered as jobs or topics of themselves.

The charts of "What People Do" in Sheet Metal, Bricklaying, Carpentry, Machine Shop, and Auto Mechanics are suggestive of the graphic analysis used as a

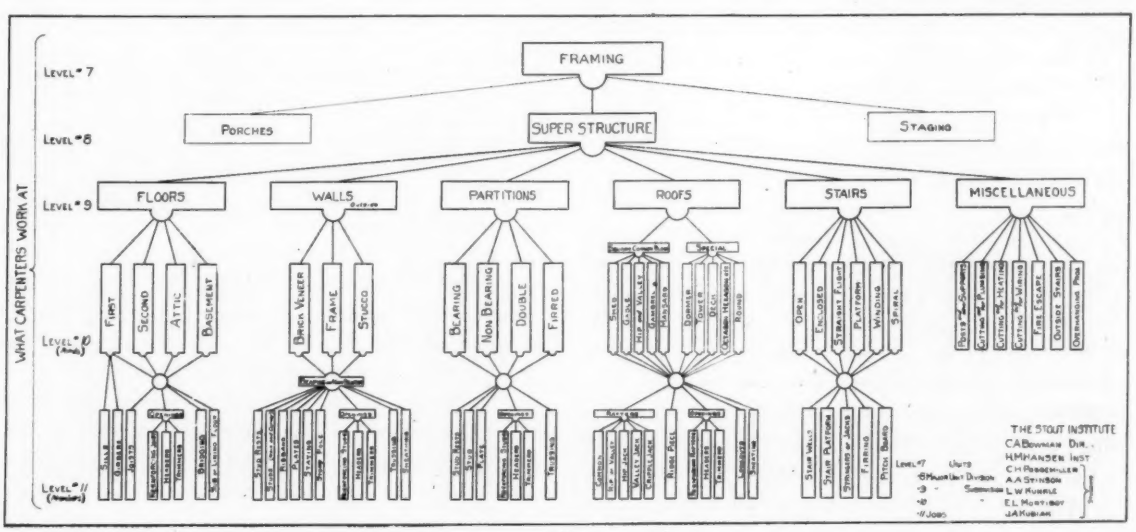


FIG. 6.

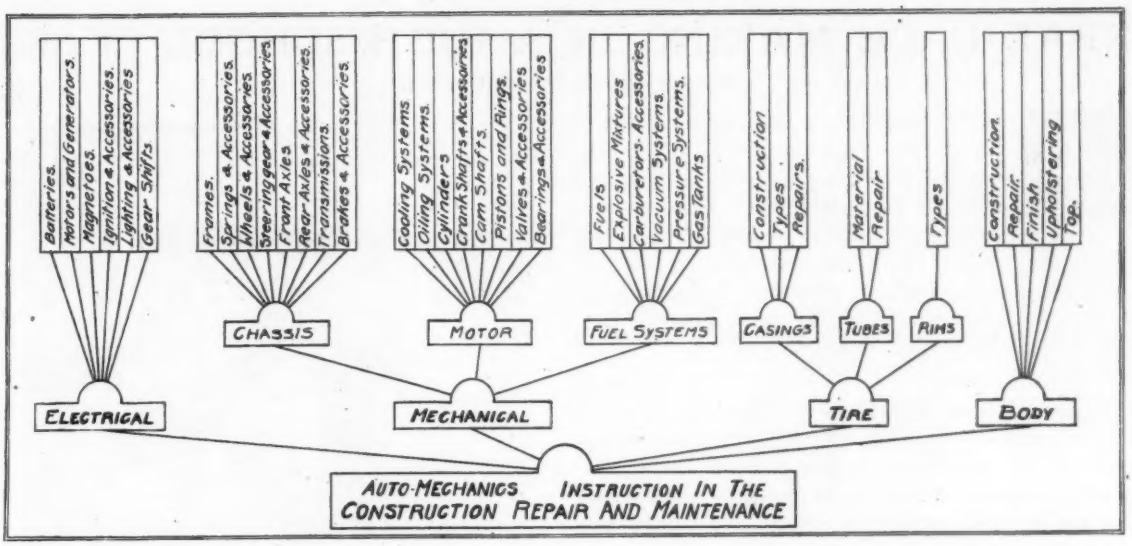


FIG. 7.

basis for *unit plans and courses* for teaching. Sample units are charted thru jobs and operations to suggest the skeleton outline followed in writing the unit analysis indicated later on sheets 4, 5, and 6 of the data sheets for recording trade analysis. There are some differences in classification bases in the kinds of trade work.

The Sheet Metal divisions are trade, major divisions, units, jobs, and operations. It is understood that, as unit analysis is carried thru as suggested in "Heating" under "Job Shop," some rearrangement of unit divisions may be found necessary. Until the unit analysis has been carried thru for the majority of the units in a major division the chart is at best tentative.

The chart of "What People Do" in Machine Shop work seems most usable when the levels are trade, major divisions, units, and operations. The trade terms the "job" often as that which takes the worker to a number of operations on a number of machines. In an analysis for teaching it seems advisable to retain this meaning for "job" and, in routing a student plus a job thru the shop, record the shop experience by divisions as suggested on the chart.

In the Bricklaying Chart the levels which seem most convenient are trade, major divisions, sub-divisions, units, jobs, and then detailed operations. Mr. Ray's device of lettering and numbering units is of direct assistance in designation in connection with planning unit courses. For example, "Jobbing A3" is "Jobbing and Small Contracts—Building—Small Houses, Stores, Garages—Jobs."

In the charts of Carpentry (Figs. 2 and 6) suggestion is made of the selection desirable from the field of possibilities. Perhaps some would prefer not so much detail. Some may prefer a heading of "Building Trades" above that of "Carpentry." The heavy lines on Fig. 2 indicate the selection for the sample detailing on Fig. 6. By reference to the level numbers immediate location is possible, and is expedited, for detail charts such as Fig. 6. "Framing," which is in level number 7, in Fig. 2, starts the levels in Fig. 6. By use of these level numbers the immediate location is available. In Fig. 6 is a suggestion for a method in indicating subdivisions between units and jobs.

In the chart of Automobile Mechanics the levels which seemed most adaptable are trade, major divisions, sub-divisions (where necessary), units, jobs, operations. In a number of classifications some use of minor subdivisions between units and jobs may facilitate use of the chart. There is need, as indicated in the chart, for use of one basis for classification of units in certain major divisions or sub-divisions and other bases in other divisions. It must be kept in mind also, as has been mentioned, that until the unit analysis has been carried thru for the majority of the units in a major division the chart is at best tentative.

(Concluded in February.)

"A man's value in the world is estimated and paid for according to the ability he uses, not what he may possess."

REAL-LACE MAKING IN A HIGH SCHOOL CLASS

Mabel W. Arleigh, Corning, California

AT THE beginning of last year we found it difficult to obtain material for a manual-arts course for girls in our high school at Corning, Calif. War conditions put metal and leather work out of the question. The pupils had had basketry, weaving, etc., in the grades and there was a demand for something new. So I introduced real lace. It has proven practical and fascinating. The pupils are enthusiastic.

For some years I have desired to teach this work, but hesitated, knowing that the beginning of it would be unattractive in a class if I used the slow, tedious methods with which it is taught in foreign lands. Necessity compelled me to devise a quick introduction, adapted for class instruction. Since it has worked out successfully, it may be of value to other teachers. It is too difficult a task for grade pupils but it seems ideal for high school girls.

The socalled "real laces," such as Cluny, Torchon, Smyrna, Brussels, Maltese, etc., are made with bobbins. A pattern may require from a dozen to over a hundred bobbins. In school we use from a dozen to thirty bobbins in a pattern, and make lace from one-quarter inch to two inches in width. The pattern is pricked in thick, tough paper. This is pinned on what is called the pillow.

There are two varieties of pillows. One is a flat board, cushioned up about one inch thick, stuffed hard and tight with fine saw dust. We save the saw dust from the saw table. The other type of pillow has a revolving cushioned spool, two and one-half inches or more in diameter, and five inches or more in length. The pattern is pinned around this spool, and as it revolves, the pattern is endless, and any number of yards can be made without shifting.

The bobbins are spread out on the pillow, two being usually held in each hand at a time. As the bobbins are passed back and forth over each other their threads are woven. Pins are placed in the pin-holes in the pattern, and these hold the lace out in position.

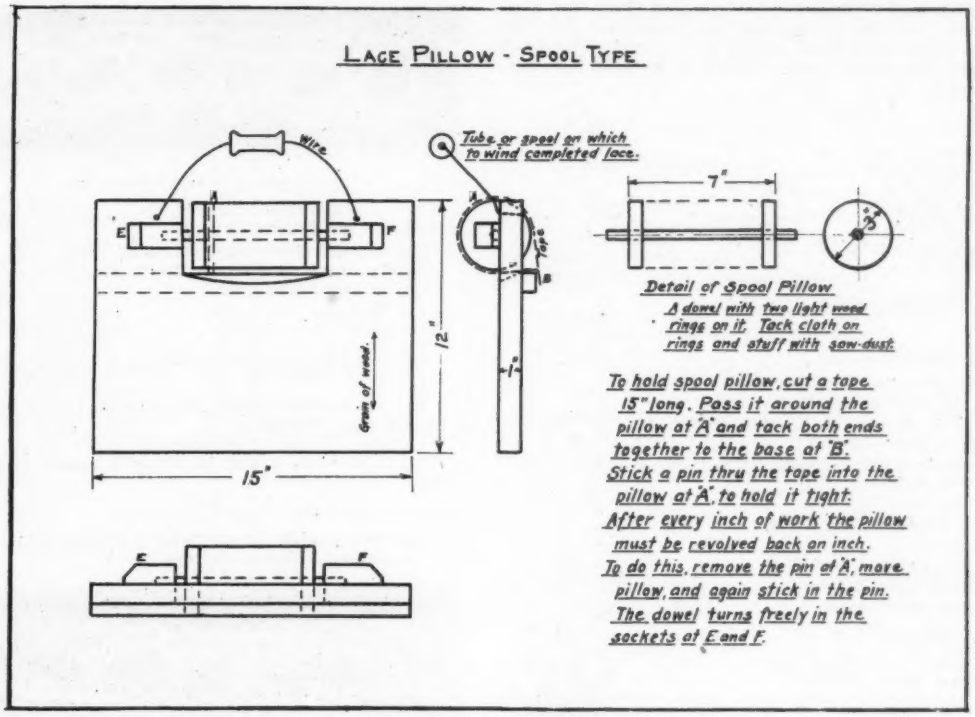
AN OUTDOOR CLASS AT THE CORNING HIGH SCHOOL.

PART OF AN EXHIBIT OF LACES MADE IN THE AUTHOR'S CLASS, SHOWING BOBBINS AND LACE PILLOWS IN USE.

The bobbins can be bought quite cheap, or made on a lathe. The pillows are easily made in a manual-training shop. We found it cheaper to buy the bobbins and make the pillows. The pupils can prick their own pattern. Pins and thread are easily procured. There is thus little expense for a large class. Lace an inch wide sells for a dollar a yard, so the work is worth while.

There are only three basic weaves, or throws, in bobbin lace. Combinations of these form every variety of pattern. We first fill the bobbins with carpet warp, and make a very course model of each pattern. The pupils can see this so clearly that they learn rapidly. Every pattern is first picked out and practiced with the carpet warp until it is perfect. Then it is easy to do it with finer thread without tangling. This idea of practicing with the carpet warp is what gives the quick and satisfactory results.

After the bobbins are wound, the thread must be fastened so that it will not unwind too readily. Make a little twist as in Fig. 1. When the thread gets short and you need to unwind, do not take out this twist; just turn the bobbin horizontal, and revolve it gently, pulling on the thread. The thread will unwind by slipping thru this twist knot. But when the bob-


LACE PILLOW - SPOOL TYPE
Wire
Tube or spool on which to wind completed lace.
7"
Detail of Spool Pillow
A dowel with two light wood rings on it. Tack cloth on rings and stuff with saw-dust.
12"
15"
Grain of wood.
To hold spool pillow, cut a tape 15" long. Pass it around the pillow at 'A' and tack both ends together to the base at 'B'. Stick a pin thru the tape into the pillow at 'A' to hold it tight. After every inch of work the pillow must be revolved back an inch. To do this, remove the pin at 'A', move pillow, and again stick in the pin. The dowel turns freely in the sockets at E and F.

DETAILS OF LACE PILLOW.
This makes a good project for the Manual Arts Department.

bins are held vertical, the thread will not slip thru this twist knot. Fasten every bobbin in this manner.

As you work the bobbins should lie in an even row across the pillow, with threads unwound about six inches from the pattern. As you work always keep the

FIG. 1.

bobbins even. Always keep the pins in the lace for about two inches, so that it does not get pulled out of shape. Then remove the pins from the back row as you need to use them in working on.

Lesson 1, Four-Ply Plait.

Four bobbins, no pattern.

Tie the ends of the four threads together, and pin firmly to the pillow. Keep all threads about six inches long. Lay them parallel and even. Number the bobbins mentally from left to right. Each time a bobbin is moved it changes its number according to its new position.

FIG. 2.

Net Weave. First lift bobbins number 2 and 4. Move them to the left, each over one bobbin, and lay them down. Then lift 2 over 3, so that it lies in the third place. These two movements together are called N, or net weave. Repeat the net weave and it is called hole weave, or H. H is thus just double N.

Continue the plait, or braid, by repeating the N weave. Hold the threads firmly and evenly. Give the bobbins a quick swing apart with each weave, so as to throw the weaving up close to the pin. Make a plait several inches long.

Practice until you can hold two bobbins in each hand, and roll them back and forth rapidly, making an even four-ply braid.

Lesson 2, Bobinet.

Six pairs of bobbins; pattern No. 1.

This pattern has 4 dots or pin-holes across the beginning end and a row of holes down each side,—not opposite each other, but alternate. Place these dots ⅜" apart. Tie the loose ends of the bobbins together in pairs. Pin the six pairs to the four dots at the top thus;—two pairs to each corner dot, and one pair each to the other two dots. Number the pairs from left to right. 1 2 N, (this means use pairs 1 and 2, net weave). No. 1, between 1 and 2, (pin in dot No. 1, between pairs 1 and 2).

1 2 N,
2 3 N,
3 4 N,
4 5 N,
5 6 N,
No. 2, between 5 and 6.
5 6 N,
4 5 N,
3 4 N,

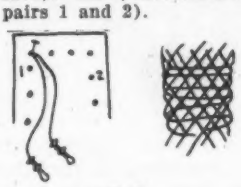


FIG. 3.

2 3 N, and continue by repeating from the beginning, pinning in the next dot each time, first on one side and then on the other.

C, means close, that is repeat after putting in a pin the weave which just preceded the pin. The C is used only after directions to pin.

Lesson 3, Diagonal Net.

Eight pairs of bobbins, pattern No. 2.

Pattern paper 2½" wide. Make dots ½" apart in alternate rows ¼" apart, so that dots are about ⅜" apart

on the diagonal. The top row has four dots, the next row 3 dots, the next 4 dots, and so on alternately. Pin two pairs to the right hand dot in the top row. Follow in a diagonal line down toward the left, pinning one pair in each dot.

FIG. 4. PATTERN NO. 2.

7 8 N,
No 1, between 7 and 8, C.
6 7 N.
No. 2 between 6 and 7, C.
5 6 N,
No. 3, between 5 and 6, C.
4 5 N,
No. 4, between 4 and 5, C.
Continue thus with each two pairs in order toward the left.
1 2 N,
No. 7, between 1 and 2, C.
Repeat with each row.

Lesson 4, Base Net.

Eight pairs of bobbins, pattern No. 2.
Pin the same as for lesson 3.
The hole weave, H, is just double the N weave, but the effect is quite different.
Remember that C means close, that is repeat the H weave after each pin.
7 8 H,
No. 1 between 7 and 8, C.
6 7 H,
No. 2 between 6 and 7, C.
Continue as in lesson 3, using the H weave instead of the N weave every time.

Lesson 5, Bar Net.

Six pairs of bobbins, pattern No. 1.
Pin just as for lesson 1.
1 2 H,
No. 1 between 1 and 2, C.
2 3 H,
3 4 H, 4 5 H,
5 6 H,
No. 2 between 5 and 6, C.
4 5 H,
3 4 H,
2 3 H, and continue by repeating from the beginning.

FIG. 5.

Lesson 6, Linen Tape.

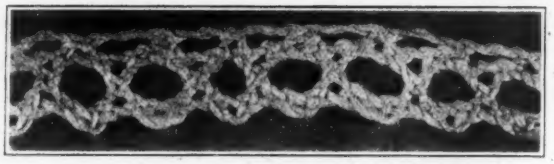
The linen weave, or L, uses 4 bobbins at a time, just as the H, or N; but the order of the throws is different, and the result is very different. Number the bobbins as shown 1, 2, 3, 4, from left to right.
First, lift bobbin 2 over bobbin 3.
Second, lift 2 and 4 one place to the left.
Third, lift bobbin 2 over bobbin 3.
The three moves above are named linen weave, or L.
For the linen tape, use pattern 1, and six pairs of bobbins, pinned as for lesson 2.

FIG. 6.

1 2 L,
No. 1 between 1 and 2, C.
2 3 L,
3 4 L,
4 5 L,
5 6 L,
No. 2 between 5 and 6, C.
4 5 L,
3 4 L,
2 3 L.
Continue by repeating from the beginning, weaving back and forth.

Following are the directions and patterns for six simple laces. They are all based on the above introductory work. Work out each of the following patterns first with carpet warp. For this the dots should be three-eighths to one-half inch apart. For coats crochet-cotton mercerized, place the dots one-quarter inch apart. For No. 70 cotton thread, or No. 90 Barbours linen thread, place the dots one-eighth inch apart. Embroidery silk can also be used.

The pattern should be pricked on a strip of paper long enough to go around the spool cushion and lap well. The ends of the pattern must match perfectly where they lay. The spool cushion can be padded out by wrapping a piece of cloth around it part way, in order to make this matching perfect.



HOLE EDGING. SEE LESSON NO. 7.

Lesson 7, Hole Edging.

Pattern #3

For handkerchief edge, or collar edge.
Five pairs of bobbins, pattern No. 3.
Pin in two upper dots.
2 3 H,
3 4 H,
4 5 H,
No. 1 between 4 and 5, C (draw 5 snug.)
2 3 H,

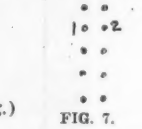
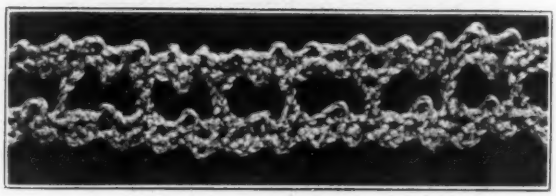


FIG. 7.

T 1 (this means twist pair 1, once to the left, or lift bobbin 2 over bobbin 1).
1 2 H,
No. 2 between 2 and 3, (draw 3 snug.) Repeat, endlessly.

Lesson 8, Beading.

Narrow beading for running a ribbon thru.
Six pair of bobbins, pattern No. 4.



BEADING. SEE LESSON 8.

Pin three pairs in dot No. 3, and three in dot No. 6.

Pattern #4

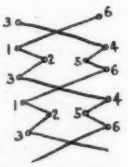
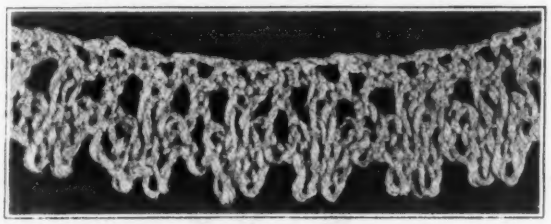


FIG. 8.

2 3 H,
1 2 H,
No. 1 between 1 and 2, C.
2 3 H,
No. 2 between 2 and 3, C.
1 2 H,
No. 3 between 1 and 2, C.
2 3 H
4 5 H,
5 6 H,
No. 4 between 5 and 6, C.
4 5 H,
No. 5 between 4 and 5, C.
5 6 H,
No. 6 between 5 and 6, C.
4 5 H,
T T 4, T T 3,
3 4 H,
T T 4, T T 3. Repeat.



DIMPLE EDGING. SEE LESSON 9.

Lesson 9, Dimple Edging.

Six pairs of bobbins, pattern No. 5.
Pin two pairs each in No. 1, No. 2 and No. 3.
4 5 H,
No. 4 between 4 and 5.
4 5 L,
T 6,

Pattern #5

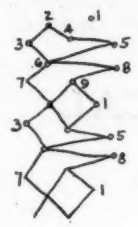


FIG. 9.

5 6 L,
T 6

No. 4 between 5 and 6.
5 6 L,
4 5 L,
2 3 H,
3 4 L,

No. 6 between 3 4, C.
2 3 H,
T 1; 1 2 H,

No. 7 between 2 3.
2 3 H,
4 5 L,
5 6 L,
T 6,

No. 8 between 5 6.
5 6 L,
4 5 L,

No. 9 between 4 5.
4 5 H,
5 6 H,

No. 1 between 5 6, C.
3 4 H,

No. 2 between 3 4.
2 3 H,
1 2 H,

No. 3 between 2 3; repeat from beginning.

Lesson 10, Picot Edge.

Seven pairs of bobbins, pattern No. 6.

Pin two pairs each in No. 4 and No. 7, and three pairs in No. 3.

Pattern #6

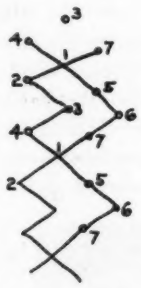


FIG. 10.

2 3 H,
3 4 H,
4 5 H,
5 6 N,
6 7 N,

No. 1 between 6 7.
5 6 N,
4 5 H,
3 4 H,
2 3 H,
1 2 H,

No. 2 between 2 3.
2 3 H,
3 4 H,
4 5 H,

No. 3 between 4 5, C.
3 4 H,
2 3 H,
1 2 H,

No. 4 between 2 3.
5 6 N N N (braid)

No. 5 bet. pair 6 (picot)
5 6 N N N,

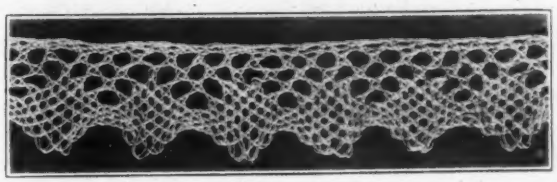
No. 6 bet. pair 6 (picot)
5 6 N N N (braid)

No. 7 bet. pair 6 (picot)
5 6 N N N; repeat from the beginning. (For the picot, twist the thread once around the pin).

Lesson 11, Diamond Point Edging.

Eight pairs of bobbins.

Pin two pairs in 17, three pairs in 18, and one pair each in 6, 13 and 15.



DIAMOND POINT EDGING, PATTERN NO. 7. SEE LESSON NO. 11.

Pattern #7

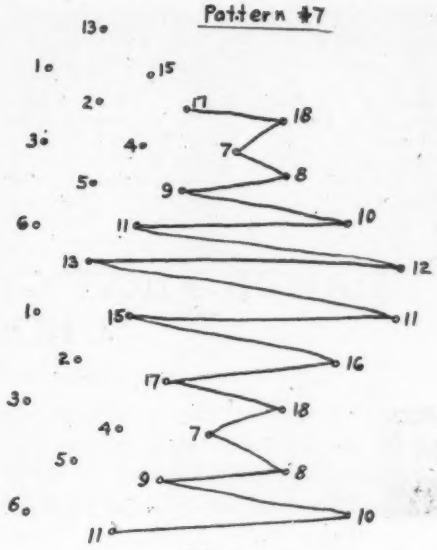
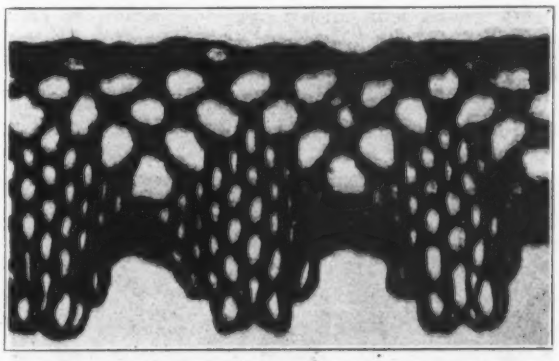


FIG. 11.

Selvage.
1 2 H,
No. 1 between 1 2, C.
2 3 N,
No. 2 between 2 3, C.
1 2 H,
No. 3 between 1 2, C.
3 4 N,
No. 4 between 3 4, C.
2 3 N,
No. 5 between 2 3, C.
1 2 H,
No. 6 between 1 2, C.
Point.
7 8 N, 6 7 N, 5 6 N,
No. 7 between 5 6, C.
6 7 N, 7 8 N,
No. 8 between 7 8, C.
6 7 N, 5 6 N, 4 5 N,
No. 9 between 4 5, C.
5 6 N, 6 7 N, 7 8 N,
No. 10 between 7 8, C.
6 7 N, 5 6 N, 4 5 N, 3 4 N,
No. 11 between 3 4, C.
4 5 N, 5 6 N, 6 7 N, 7 8 N,
No. 12 between 7 8, C.
6 7 N, 5 6 N, 4 5 N, 3 4 N, 2 3 N,
No. 13 between 2 3, C.
3 4 N, 4 5 N, 5 6 N, 6 7 N, 7 8 N,
No. 14 between 7 8, C.
6 7 N, 5 6 N, 4 5 N, 3 4 N,
No. 15 between 3 4, C.
4 5 N, 5 6 N, 6 7 N, 7 8 N,
No. 16 between 7 8, C.
6 7 N, 5 6 N, 4 5 N,
No. 17 between 4 5, C.
5 6 N, 6 7 N, 7 8 N,
No. 18 between 7 8, C. Repeat from the beginning.



PRACTICE PIECE WITH COTTON WARP. LESSON 11.

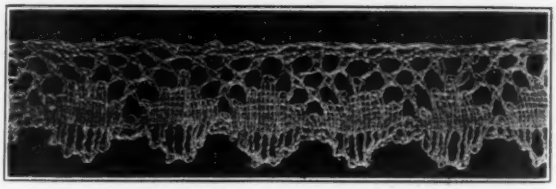
Lesson 12, Point Edging.

Eight pairs of bobbins, pattern No. 7.

Follow the directions for the diamond-point edging selvage. Then at Point use the following, instead. That is, these two laces have the same selvage edge, but the point differs.

Point.
6 7 L, 5 6 L,
No. 7 between 5 6, T 5.
5 6 L, 6 7 L, 7 8 H,
No. 8 between 7 8, C.
6 7 L, 5 6 L, 4 5 L,
No. 9 between 4 5, T 4.
4 5 L, 5 6 L, 6 7 L,
TT 7, 7 8 H,

No. 10 bet. 7 8, C; T T T 7.
6 7 L, 5 6 L, 4 5 L, 3 4 L,
No. 11 between 3 4; T 3.
3 4 L, 4 5 L, 5 6 L, 6 7 L,
T T T T 7, 7 8 H,
No. 12 bet. 7 8, T T T T 7,
6 7 L, 5 6 L, 4 5 L, 3 4 L, 2 3 L,
No. 13 between 2 3; T 2.
2 3 L, 3 4 L, 4 5 L, 5 6 L, 6 7 L,
T T T T 7, 7 8 H,
No. 14 bet. 7 8, T T T T 7.
6 7 L, 5 6 L, 4 5 L, 3 4 L,
No. 15 bet. 34, T. 3.
3 4 L, 4 5 L, 5 6 L, 6 7 L,
T T T 7, 7 8 H,
No. 16 bet. 7 8, T T 7.
6 7 L, 5 6 L, 4 5 L,
No. 17 between 4 5, T. 4.
4 5 L, 5 6 L, 6 7 L, 7 8 H,
No. 18 bet. 7 8, C.
Then make the selvage; then repeat the above point.



POINT EDGING, PATTERN NO. 1. SEE LESSON 12.

BABY'S FIRST CLOTHES—A PRACTICAL SCHOOL PROJECT

Edna J. Benson, Supervisor of Sewing, West Orange, N. J.

MR. F. M. M'MURRY, in a recent work, emphasizes the finding of specific purposes as one of the chief factors in study. This same thought may be applied to the selection of school problems in manual arts. The time has passed when we select projects just because they teach certain processes. They must fulfill a definite need. Sewing, if properly planned, offers us the opportunity to correlate the activities of the home and the school in a way which is sure to employ the natural interest of the girl.

It is the exceptional girl, around the ages of 11 to 13, who is not interested in the planning and making of the baby's clothes.

This problem is adaptable for seventh or eighth grade classes. The opportunity for enthusiasm and interest in this work is unlimited. Impatience to begin was noted in the repeated question, "When are we going to start the baby's clothes?"

Under the writer's supervision there were four eighth grades with an average of seventeen in each group. Two methods of the distribution of work might be employed, either making complete outfits in each group or allotting one or two garments to each group. Both methods have advantages. By the former the girls get practical experience with nearly all the garments, whereas the latter method is better for large classes. We chose the latter method because of the large number in the classes.

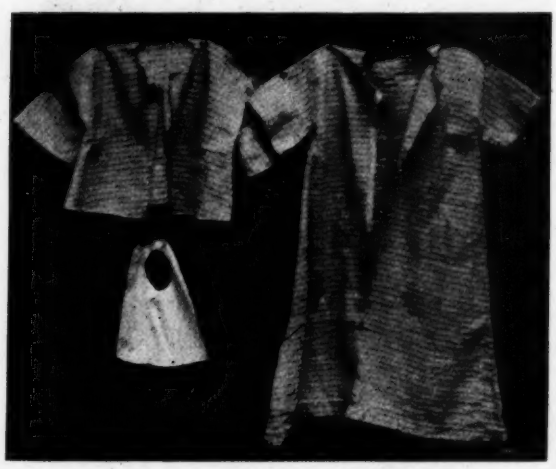


FIG. 1. A—TOP LEFT; B—BOTTOM LEFT; C—RIGHT.

Before the work was actually begun we talked and studied various methods of better care of babies. *The Woman's Home Companion* furnished us with charts, depicting types of clothing and the care of the baby.

Only the simplest of commercial patterns were used, as it was deemed unwise and impracticable to make fussy and overtrimmed garments. Two types of dresses were chosen, the simple one-piece kimono type, suitable for a slip and a set-in sleeve model; a long and short flannel kimono, and the Gertrude petticoat of nainsook and flannel. We omitted the barrow skirt, as it is not considered as satisfactory as the Gertrude, which hangs from the shoulder, while the barrow skirt is apt to constrict the freedom of the child. Rough laces and stiff embroideries were taboo; instead we had dainty stitches, French knots, feather stitching and the blanket stitch.

Each girl cut her own garment from the paper pattern. Typewritten directions, similar to those on the patterns, concerning each garment, were distributed to the girls before sewing. The following is a sample:

Short Kimono.

1. Baste long seams together on wrong side ¼" from edge.

2. Stitch.

3. Cut down wrong side of stitching. Catch stitch remaining edge flat after it has been trimmed. (See the Dressmaker, page 5, figure 11.)

4. Turn ¼" to wrong side around the neck. This turning must be nicked. Turnings around sleeves and bottom ¼". These are to be catch stitched. (See Clothing for Women, page 364, figure 215 B.)

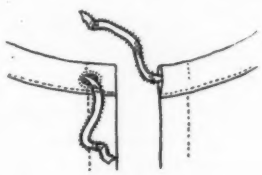
5. These flannel hems are to be blanket stitched. (See The Sewing Book, page 8, figure 7.)

6. Sew on ribbons, one-half yard cut in two pieces. (See model.)

This was a splendid opportunity to teach independence and responsibility. Each girl was obliged to show her work before, and after, stitching. In this way mis-

takes were avoided. The girls were familiar with the different processes and were at liberty to consult various books and references in the sewing room. Aside from the first reading and explanation, the instructor was free from explaining each step and the girls followed according to individual speed. There was also a completed set of garments that served as models.

III. Photograph 1 shows the kimono slip and the set-in sleeve model. Both garments were made of fine nainsook and were of 24-inch length when completed French seams were used and each had a 1-inch hem feather stitched. Simple plackets 10 inches in length were made down the back. Around the neck, bias binding was used as a band. On the slip it was put on plain



but the dress was slightly gathered to fit the band. Both bands were larger than the baby's neck and narrow linen tape served as a draw-string. Before hemming this band down by hand it was feather stitched and an eyelet hole made on the left or under side, one-half inch from the edge of the band. No buttons were used, and when tied the placket lay flat without gaping. The draw string thru the neckband is considered much better than a fitted band, as the latter often proves too tight for the very young baby.

On the slip, one-half inch bias facing served as hems thru which narrow linen tape was drawn. An eyelet hole could be made in the hem around the lower edge and a draw-string used for a night slip.

On the dress, the sleeves were gathered to fitted bands, and the sleeves set in by the French seam method.

FIG. 2. A—LEFT; B—RIGHT.

FIG. 3. A—LEFT; B—RIGHT.

The seams and first stitching of the bands were done by machine, the hems feather stitched and the bands hemmed by hand. It took 1½ yards of nainsook at 26 cents, wholesale; thread and tape were figured at 5 cents, making a total of 44 cents. The dresses sold for 60 cents and the slips for 55 cents. Before placing a price on the garments, investigation at the cheapest stores for the cheapest lawn dress was 79 cents.

III. Photograph 2 shows the short and long flannel kimono; also a bib made from the pieces which fell off the sides of the dresses. These were made of two thicknesses, feather stitched, and fastened with a tiny button, and sold for 10 cents.

The kimonos were made of outing flannel, blue and white checked, and pink and white checked. Directions for the short kimono have already been given. The only differences in construction between the long and short one were the 1-inch hem at the bottom of the long kimono and the double set of strings. Both were blanket stitched around the narrow hems with colored embroidery cottons and the wide hem feather stitched. Before the decorative stitch was used a flannel hem, of one turning, catch stitched with fine sewing cotton, was done. The short kimonos cost 30 cents to make and sold for 35 cents, while the long ones cost 40 cents and sold for 50 cents. The cheapest long kimonos were found to retail for 98 cents.

White dormet flannel was employed in the making of the flannel Gertrudes, the seams of which were stitched by machine, one side trimmed and the remaining side catch stitched flat. A 1-inch flannel hem was placed at the bottom, while around the neck and arm holes single turnings were catch stitched first and blanket stitched in white Utopia (two strands) as a finish. Narrow linen tapes were sewed flat on the shoulders to serve as fasteners. It cost 33 cents to make this garment and it sold for 40 cents.

The seams of the nainsook Gertrude were flat felled, the first stitching made by machine and hemmed flat on the wrong side. Hem at lower edge was 1 inch, made by machine, and one-eighth inch around neck and arm holes, made by hand. The method of closing employed here was a tiny button and loop on each shoulder. It cost 32 cents and sold for 40 cents.

Great emphasis was placed on the construction of these garments and the need for flat finishes and seams was explained. Pins, as a method of fastening, were objected to; as few buttons as possible, and those very small, while narrow draw-strings were considered very practical. It was pointed out that rough or raw edges were apt to irritate the delicate flesh of a tiny baby.

These plain and simply made garments were sold at an advertised sale to the mothers of school children, thru the school nurses, and a local community house and the nurses' settlement.

It was not our aim to make a profit on the garments, as most of them were sold to mothers of limited incomes, and we were serving the community. The latter spirit we emphasized with the children, and each one felt as if she were performing a service. It supplied the lack of Red Cross work.

A METAL WORK PROBLEM

G. A. Seaman, Perth Amboy, N. J.

THE writer desired for his classes in metalwork, a project which would embrace all the processes which the boys had learned during the earlier part of the year, and which would offer the greatest opportunity for practically applied mathematics. The motor shown in the drawings was evolved as fitting the requirements.

While there is nothing startlingly new in the design, there are a few features, notably the brushes and commutator, which are, perhaps, worthy of note.

The construction of the motor was carried on as a class problem, and individual assistance given only when a boy acknowledged himself "stuck". At the very beginning, emphasis was laid on the necessity of careful and accurate laying out and painstakingly following the layout. The use of the various tools, particularly taps, dies, and drills, was thoroly explained and demonstrated as they were required; and as each part was finished, the instructor checked it. Some little assistance in bending the field magnet, and in tapping the iron parts was given by the instructor, otherwise the boys were well able to handle the work.

The field magnet is of 3/4x3/16-inch soft iron, and is formed at a red heat on an anvil, the curves being finished on a piece of pipe held in a vise. The right-angle bend is made first, and hooked over the side of the anvil, while a 45° bend is made in the other end, this latter being then formed into an arc on the pipe. This method insures the curves matching when the pieces are placed upright. The flats are then filed, and the two holes are drilled and tapped. The field core is a piece of 1/8-inch pipe cut to a length which will allow a 2 1/8-inch disc to fit snugly into the curves, and the whole bolted together.

The brass pieces present no difficulty other than drilling the holes so as to bring them squarely across the pole pieces. This is done by clamping the brass to the pole piece, and marking thru the holes in the latter. Right here is an excellent opportunity for a demonstration and discussion of the use of the tap drills and body drills.

The armature is laminated, being made of three 1/8x1-inch pieces of soft iron, each cut to a template, and centered from the template. They are riveted together and keyed to a 20d nail, serving as a shaft, by filing a flat on the nail, and punching the armature iron into it. The shaft is centered in a frame by using a compass in several places on the curved pole pieces. The bearings are not drilled until both the field and armature are completed.

The brushes are made of thin brass, and are sufficiently clear in the drawing.

The commutator is made of two duplicate pieces of 1/4-inch fiber, each being drilled with a 1/4-inch drill, mounted on a spindle in a lathe, and locked on by a round nut of the size it is desired to make the barrel of the commutator. The fiber is turned and filed down to the size of the nut, leaving a shoulder or flange in which a fine groove is made with the point of any sharp tool. This is clearly shown in the detail drawing. Two small slots are then cut in one flange, in which the ears on the commutator segments are placed, thus keeping the segments from turning, and affording a place to solder on the armature connections. The segments are then placed on the fiber pieces, and the whole riveted together by a piece of 1/4-inch copper tub-

PRIMARILY we must have schools, everlastingly and in numbers: schools of design for all the industrial arts situated in their respective territories with regard to production; also industrial arts teaching in the general schools, teaching of industrial arts appreciation in all the schools, not omitting colleges—all of this instead of meaningless and aimless drawing without objective in actual execution.

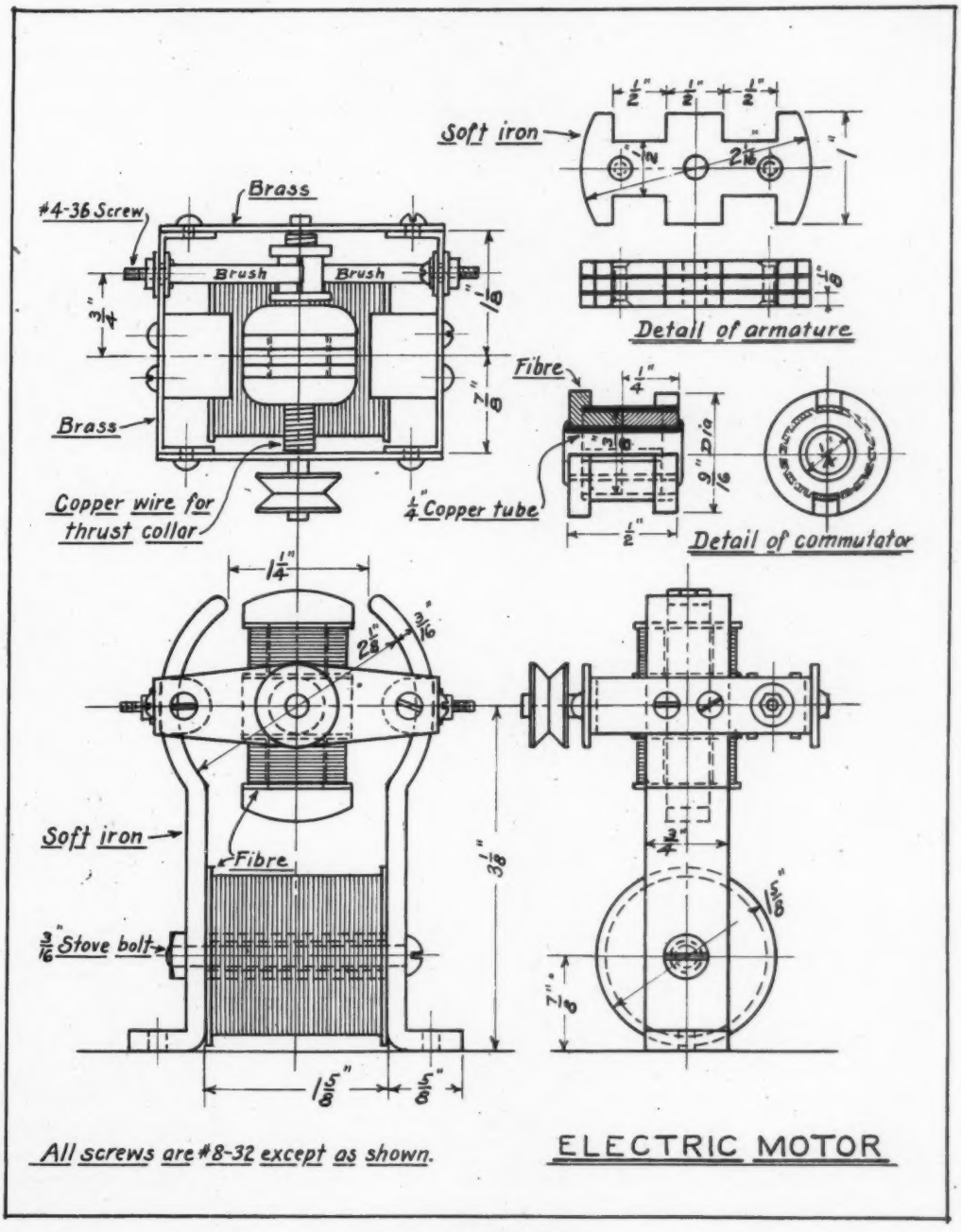
—*Richard F. Bach.*

ing pushed thru the center hole and flanged out on each end.

The commutator is a driving fit on the shaft, and needs no further fastening.

The fiber coil washers on the armature are split and sprung into place. All coils are wound with No. 20 S. C. magnet wire, the armature by hand, the field by mounting it on a bolt held in a hand-drill. Care must be taken to wind the armature coils both in the same direction, otherwise they "buck" each other.

While the construction of a small motor is a tedious and "fussy" proposition, no difficulty was experienced in keeping the boys interested, owing to the fact that, as every one knows, all boys are invariably enthusiastic about anything that "works". "Time out" was also freely taken, to lecture on the various processes, to experiment with magnets and coils, and to explain and demonstrate the operation of a simple motor. The work was given to seventh grade classes spending their time equally between academic work and the shop.



DETAILS OF ELECTRIC MOTOR.

WELL-TO-DO TEACHERS

E. E. Dodd, University of Missouri, Springfield, Mo.

ONE SUMMER afternoon, many years ago, three country boys, of whom the writer was one, went into a great woods to engage in the sport (for sport was the motive) of hunting squirrels. Shortly after entering the woods the boys met up with a neighbor boy, Josh Roberts by name, who said, "Boys, I want to get a squirrel. Sallie is sick, you know, and we want to make her some broth."

Sallie was the pretty sister of Josh and most popular among we country boys. A mandate from the war department would not have inspired motive in the boys as those simple words of Josh did. Each boy became a Nimrod in earnest, and the squirrels we bagged that afternoon would have made broth for the patients of Cook County hospital.

But what possible connection can there be between that long-ago quest for squirrels and the subject of this article, Well-To-Do Teachers? The answer is to be found in the word, motive.

As never before in the history of teaching, heed is being given to the salary interests of teachers. I should like to be able to state the case more broadly and strongly by saying, *to the permanent material welfare* of teachers, but present circumstances do not warrant so broad or strong a statement.

In the recent literature bearing upon teachers' salaries, including the reasons why they should be granted, almost nothing has been said upon what I regard as the motive of paramount importance; namely, this permanent material welfare of the teacher.

But just what does this mean? There is much significance in the somewhat common, homely expression, "Mr. X. is one of our well-to-do citizens," and how fine it would be if we could truthfully say, referring to any representative, experienced teacher, "Mr. T. or Miss T. is one of our well-to-do citizens." Well-to-do means having prospered in a material way; having laid aside something for the rainy day; having protection against the exigencies of age and the unexpected turn of fortune's wheel. Well-to-do means confidence, security, stability, responsibility and independence. It inspires respect, it suggests ability to provide, to help, to meet emergencies.

Applied to the teacher's case, well-to-do means adequate salary, the inclination and ability to accumulate, the knowledge and practice of safe, profitable investment. True enough, this all has a material sound. It does not smack of what we know as professional spirit, but it is just what teachers most need to ponder when the question of teachers' salaries is before them.

But, you say, "One thing at a time. Better get the adequate salary before you administer it; 'better catch your hare before you cook it.'" What I mean to say is, that the motive for catching the hare, like the long-ago motive for hunting squirrels, will play no small part in determining the result.

Permanent Material Welfare.

No one will question the urgency of present day living demands, or the part the teacher's salary must take in meeting them. But to proceed on the theory that the teacher's salary is adequate when it enables him merely to live from one pay day to the next, or on the theory that the teacher has then met all obligations to himself, is to proceed in purposeless fashion in a matter of profound concern to the teacher.

Does such a hand-to-mouth existence foster the qualities which make for strong manhood or womanhood; does it inspire confidence; promote self-reliance; prompt a spirit of independence or give protection against future exigencies? Does such an existence place the teacher before the school and the community in a favorable light? No; the factors which determine the well-to-do citizen are not there, and the evidence of his strength and potential usefulness are necessarily lacking.

To regard the teacher's salary merely as that which will meet the immediate temporal needs of the teacher, is to discount the occupation of teaching and place the training of the young in the hands of those who, by virtue of such a system, cannot develop the personal qualities which are essential to leadership of the young. To premise such a system denies to the teacher a fundamental aspiration of human nature, the love of possession both for the sake of possession and for what it will do and give.

To state the case positively, any survey of the teachers' salary question, made either by the teachers or the public, should look to the teacher's permanent material welfare; that is, to a status of the teacher wherein he can at least approach, if not fully share, the condition of the well-to-do citizen.

This means two things: (1) a salary that will admit of reasonable saving; and (2) the purpose on the part of the teacher to save, coupled with the ability to invest wisely.

When a teacher arrives at mature years, and takes stock as to his present and prospective status, one consideration forces itself into prominence—not, "How much was my salary thru the past years?" but, "How much do I have?" In other words, "How much did I save and how profitably did I invest my savings?" This is the big question, the one which will confront the teacher sooner or later, and what will it profit the teacher of large salary to find in his mature years that he has no savings and earnings to show for that salary?

But, on the other hand, the teacher of modest salary, if he has saved wisely and invested profitably,

not only has a material asset of great significance to show for his labor and thrift, he also has a mental equipment of value which was gained thru the progress of his saving and investment. Differently stated, the teacher, whether of kindergarten or university rank, who does not study and practice the art of saving and investment, goes undeveloped in a faculty that is fundamental to human happiness and welfare; while the one who does study and practice the art gains an advantage of the highest commercial and other value.

Knowledge of Investments.

The importance of a working knowledge of investment is exemplified in the personnel of the patrons of the postal savings, the savings bank and other forms of investment. The untutored foreigner chooses the postal savings with its two per cent interest return. He is not sufficiently informed as to the safety of the savings bank to trust his money to that institution with its four per cent interest return. The one who is a grade higher in investment confidently trusts his money to the savings bank. But the one who is well versed in investment opportunities passes on to a richer field where the interest return is materially higher.

Each one recognizes his limitations or capability in judging as to safety first and interest return. The foreigner finds his money safe with the government at two per cent; the money of the next in order is safe with the savings bank at four per cent; the money of the third is safe in note or bond which draws seven per cent.

In this conection, two questions can properly be applied to teachers:

1. Do they, as a class, when judged by their ability to make investments, belong to the two per cent, the four per cent or the seven per cent class of investors?

2. If they are to become well-to-do citizens, to what class must they belong? No one would be rash enough to place teachers in the highest class. The reason is simple; they have neither made a study nor gained experience in the art of investment.

The teacher knows geometry only as he learns it and learns to apply and teach it. The same is true of carpentry or cookery. A like application on the teacher's part to the study and practice of the art of saving and investment will bring a like result, a working knowledge in this important field.

The present time, with its attractive investment opportunities, well illustrates the advantage which those who are versed in investment enjoy. Such companies as Armour, Swift, Goodyear, Kresge, are offering notes and bonds which will yield from seven per cent to eight per cent return. The present also is the opportune time for teachers to ponder the question of saving and investment. With higher salaries, both actual and prospective, the motive as well as the investment opportunity is at hand.

Ambition to Become Well-to-do.

The ambition to become a well-to-do citizen should be fostered by the teacher. The advantage of having money or property which the teacher can call his own should be realized; the satisfaction of seeing this money or property work for him should be felt; the comfort and security which savings and earnings give should be enjoyed; the pride which goes with the possession of material things is a natural, worthy pride, which should be experienced.

All these, coupled with the misgivings which properly attach to uncertainty, risk and improvidence, should furnish a motive to the teacher of more than any ordinary moment. What stronger incentive to the study and practice of saving and investment could the teacher want? His security, his moral courage, his self-esteem, his standing in the community, his zest for work, his happiness, his ability to serve and protect others all depend upon his ability to save and profitably invest.

Just in proportion, too, as one learns to know the earmarks of a good investment, is he alert and keen to the danger-signs of the unsafe investment; and to be able to discern these two is an equipment which every teacher should possess.

The present tendency, as we all know, is to live too much in the short span which comprehends the present and immediate future. The training of teachers should give them a perspective that looks to the more remote future. They should study to conserve and invest to the ends that they may be rated as practical rather than visionary men and women; that they may enjoy permanent material welfare; that they may have a place in the community as well-to-do citizens, enjoying the prestige and advantages which those who belong to the well-to-do class enjoy. They will then be stronger men and women, better teachers and leaders of the young, more independent, self-respecting, self-reliant factors in both the school and community life.

The subject of this article, the well-to-do teacher, should become not merely a subject for discussion; its importance entitles it to become the objective of a movement, equal in importance to the salary question. It furnishes a primary motive for adequate salaries, for wise saving and profitable investment. It is an objective to which the teacher, as a reward for his training, responsibility and labor, should confidently aspire.

Teach economy, that is one of the first and highest virtues. It begins with saving money.—*Lincoln.*

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

A REMINDER AND A FORWARD LOOK.

With this issue, The Industrial Arts Magazine starts on its seventh year. It began its career in January of that fateful and tragic year of 1914. These six years have been tempestuous years the world over. Editors and publishers know only too well how difficult it has sometimes been in the stress and anxiety of war to "keep the home fires burning" and to "keep the school shops running." Those responsible for this publication, in common with editors and publishers everywhere, have faced unparalleled shortages and uncertainties in the paper market; have met the universal problem of labor shortage; and have encountered prohibitive costs at every turn.

Now, as we begin to discern just the faintest gleam of a hope, not yet realized, of a kind of universal relief from all these trying conditions, we are conscious of a deepening sense of satisfaction and gratitude for those favoring fortunes that have kept our friends faithful and have added to their numbers; that have increased our capacity and our ambition for service; and have given us courage and high hope with which to face the next six years.

GETTING WHAT ONE WANTS.

The annual Conference of Art Teachers was in session. The program committee, for some unexplained reason, had not functioned, except to appoint a chairman. A goodly assemblage of kindred souls and no formal program was unique in the annals of this organization. Yet it was called a Conference, and conferences may be held without a formal program. So the chairman invited several of the teachers present to tell of their work, on the supposition that opportunity to complain of existing conditions is rarely ignored by teachers.

The chairman secured response from several members. Some had classes altogether too large for individual instruction. Some had almost no classes, because of lack of interest in the subject. Some could not secure materials. One teacher was overwhelmed by having a class in mechanical drawing and a class in freehand drawing at the same time and place, both of which demanded her individual attention.

Then there arose in this discouraged gathering of unfortunate art teachers one of those belligerent crusaders who announced her purpose of putting art on a higher plane of appreciation. She complained bitterly of the evident discrimination against art by other school and public interests. This vigorous disciple of art demanded that every art teacher "see to it that art be given as much place and importance in the school curriculum as any other subject." "Art, the greatest expression of civilization!" "Art, the subject that applies to every interest in life, must not be relegated to a minor place on the program, but must be a required study in the schools."

This sentiment met with general approval. Then one quiet little woman rose in her obscure corner and made the startling announcement that in her school "the Art Department was given everything it needed and sometimes more than it wanted." "Our Art Department is co-operating with every other department of our school in some way. We have made ourselves necessary to the study of various subjects, because art applies to every interest in life, and the school subjects represent these interests.

"We welcome the opportunity to make ourselves useful to those interests. Our only regret is that we cannot make ourselves more useful for want of time and energy. My pupils work overtime drawing, designing, and making the necessary things for the school community. This spring, in place of the usual Art Exhibit, we are going to have a bazaar and pageant in co-operation with other departments, which will represent the school activities. We believe that the only way to make art important in the school is to make it useful to the school."

WELL-TO-DO TEACHERS.

Mr. E. E. Dodd's article, found elsewhere in this issue, raises a most important and timely question. We trust that when this article is read it will not be dismissed with some facetious reference to the inadequacy of teachers' incomes and with that sort of impatience with which one receives suggestions from an impractical theorist.

We have abundant reason to suspect that the writer of this article knows what he is writing about. We should be willing to hazard the guess that he might be properly regarded as a good example of the highly successful teacher who, thru reasonable frugality and discriminating investment, has placed himself in that enviable class of well-to-do citizens.

Whatever may be said of the practicability of such a proposal for all teachers, it cannot be denied that such an ambition is altogether a worthy one, and one that will and should receive very great emphasis in the next few years. Certainly a very large number of teachers could make at least small, safe investments each year, judging from the manner in which they came forward in Liberty Bond purchases during the war. Large or speculative investments are not contemplated in this discussion. But, as Mr. Dodd indicates, perfectly safe and satisfactory returns may be secured from investments on plans of weekly or monthly payments similar to the plans of the various Liberty Loans.

The teacher, at least, owes it to himself or herself to investigate the possibilities of substantial returns from small, regular, and safely secured investments. It is only fair and reasonable that teachers should devote some thought and effort toward their own future independence and comfort. And even if it should not be immediately possible to accomplish all that is desired along this line, there should be a vigorous and sustained movement inaugurated not only to see to it that teachers are adequately paid but also to furnish them with such authoritative information and guidance as will make possible wise and safe investments with the assurance of early and substantial returns.

BILL AND OLD PROFESSOR X.

IT WAS at the class reunion that a substantial member of the class, a successful contractor, recalled to our minds old Professor X. as the one teacher of our youth whose instruction had influenced him most. Of course we all remembered the easy-going, kindly old gentleman who had passed on to his reward, and we were much surprised that Bill should single him out as the one whose instruction in art had functioned in the life of a busy contractor.

Some of us recalled how we had taken advantage of the easy-going methods of Professor X., and had taken little advantage of his wise instruction; but Bill was enthusiastic. To Bill, this almost forgotten teacher marked the sharp turn in the road that leads to success. Not that Bill was a great creative artist, for he was much better at Arabic than Greek figures, as we all knew. Bill could figure his expenses at school to the last cent, and he had earned most of those expenses while in school, doing odd jobs about the campus.

Now Bill gave each year to the support of the school as much as some of us could earn per annum. Wherein, then, could Bill have secured the incentive for a successful business career from his study of art? Let Bill tell us in his own words:

"I took instruction in Art with Professor X. because the course was a part of the curriculum in architecture that was designed to make creative artists, and which I followed as a matter of interest in building.

"I secured three convictions from that instruction: First, that I could never hope to become a great artist, because I lacked the creative genius. Second, that art is the most valuable production of human energy, because it marks human progress by the adaptation of materials to convenience and beauty. Third, that in our modern social organization the artist must find expression thru the faithful production of the artisan.

"With these convictions I determined to become the faithful producer of artistic monuments, and I am almost as proud of the buildings I have erected as the designers of them should be."

Bill had followed a course of study under a teacher skillful enough to instill respect for the subject. Bill had *found himself* under the wise guidance of old Professor X.

THE CONTINUATION TEACHER'S OPPORTUNITIES AND RESPONSIBILITIES.

A TEACHER of Continuation subjects in a community where the employers have not yet agreed to pay the pupils for time spent in school, remarked, "I should feel almost criminal if I were to consume these children's time in my classes without giving them something definitely helpful and profitable—something that fits into their conscious needs, their purposes, and their lives. I should feel as if I were taking money from them without giving them value received for it."

Does anyone doubt that a teacher with such a conception of her duty and her opportunity will always give abundant returns for every penny sacrificed by the part-time pupils who must come to her classes? But whether the employer pays for the time or the young workers lose the wage, and thereby pay for the privilege of attending school, the obligation is the same on the part of the teacher. In the continuation school, it is an eternal race with the rapidly disappearing opportunities. Next year or next month or next week may be too late to reach certain ones who may be sorely in need of assistance. The eight hours per week may seem to some to be too short in which to accomplish anything worth while. What an error! Eight hours per week may be sufficient time in which to arouse new interests, to discover new aptitudes, to develop new ambitions, and to change the whole course of multitudes of young lives. Eight hours a week may be so skillfully organized and employed and related to the every-day lives of the pupils as to make of their daily tasks laboratory experiences that will interpret and enrich the school classwork.

The proper conception of the continuation school work, therefore, is that it carries the school into the shop and store and office wherever boys and girls are found, and in return carries the shop and store and office into the school and uses all for the education and advancement of the youthful workers who have heretofore been lost to the schools.

Let it be said, therefore, to continuation school teachers, especially during the early days of the pupils' return to school: "Waste no time; deal with those topics only which have vital messages for the pupils; make sure that the work grips the pupil with an interest that insures his utmost efforts; become familiar with the pupils' lives, their homes, and their work; be their friends, share in their difficulties and their hopes, and keep them eternally busy with problems that vitally concern their present and their future welfare."

The University of the State of New York **is offering 25 scholarships to persons who desire to prepare themselves for trade and industrial teachers. Those selected to hold the scholarships must complete a one-year industrial teacher-training course, after which they are licensed for life to teach a trade, industrial or technical occupation in the state.**

The Farm Repair Shop as a Factor in Project Work

A. B. Carter, Nashville, Tenn.

DOUBTLESS many teachers of vocational agriculture will this year for the first time have students enrolled who desire to choose as their project some phase of farm repair and construction work. In considering the feasibility of such projects as those the importance of the farm shop cannot be overstressed. The success of a project in repair or construction work depends largely upon the facilities offered by the farm home in the way of a work shop and equipment.

Modern farm methods have led to the introduction of many costly and intricate machines. To keep those machines in repair and in proper working order requires more mechanical skill than is possessed by the average farmer. Farm repair and construction work is, or ought to be, a phase of scientific agriculture, and as such ought to measure up to the standards set by good farming practice.

The boy who has had two years of training in the school shop, provided he is of the "mechanical turn," should have acquired sufficient manipulative skill to carry out successfully a project in repair or construction work. Most boys like to tinker with tools and they show a surprising aptitude for learning the mechanism of farm machines. To such boys as these the repair and maintenance of the farm machinery and implements suggests itself as an attractive project. Other boys show more enthusiasm over construction work; to such as these we suggest the construction of fences, gates, laying new roofs, building poultry houses, etc. There are others who would be interested in painting as a minor project; for these we suggest the painting of the barns and outbuildings. After having acquired sufficient skill the painting of the farm home would appeal to them as a supplementary project.

To the less experienced teacher a word of warning may be in order. Too frequently manual training teachers have been criticised for the mere development of mechanical skill. It is not our thought to disparage the value of mechanical skill, for in itself it is worthy of much consideration. Nothing is easier than falling into slovenly methods of performing an exercise. This leads ultimately to careless and inefficient work. The teacher should rather keep in mind as his main objective the development of a purposeful activity, which is the outgrowth of choosing and planning a project, the selection of tools and materials, the procedures and records kept.

In order to insure the success of a project at the outset, a definite understanding with the parent is imperative. The farm shop and its equipment, if the project is one of repairs, the terms under which it is to be used, the supply of materials, and the labor compensation are some of the points upon which to agree. If it is to be a project in construction work there must be a definite agreement as to who shall furnish the materials and on what basis the boy shall be recompensed for his time and effort. The parent, if he is wise, will refrain from interfering in any way with the supervision on the part of the teacher. Should the equipment of the home shop prove inadequate, satisfactory arrangements may be made whereby the school shop equipment may be made to supplement in such emergencies. In every project undertaken sympathetic relations must be established between the parent and the teacher; the combined effect of these will then act as a stimulus to the student.

There must at all times be a hearty co-operation between the teacher and the student. Before undertaking any exercise involving considerable outlay of time and expense, the student should be required to submit to the teacher plans and outlines of the contemplated exercise. By following this plan costly mistakes may be avoided and ultimate discouragement saved the student. Careful records of all labor expended, materials used, and expenses involved should be required of the student. It is a wise provision to insist that these be presented at the completion of each exercise. Such a practice affords applied business training and is not to be minimized. Other points for scoring the student's project, such as the appearance of the shop, condition of tools, quality of work, and workmanlike methods may prove suggestive.

Blackboard Perspective Drawing

Wm. V. Winslow, North Tonawanda, N. Y.

WITHOUT a doubt many teachers are endeavoring to present object drawing without giving the class a sufficient amount of tangible information upon which the student can base his effort. It is equally true that this particular kind of drawing will be of most value to the majority of students. How can the principles of perspective best be taught?

Just how much time should be allowed for this phase of art is not important so long as the student understands in a general way the principles of perspective and is able to apply them. Upon leaving the grammar grades the boys and girls, I think we will agree, should be able to express themselves by means of pencil and paper. This ability is developed to some extent in most school systems in the academic classroom,

but object drawing will receive additional motivation in the industrial department, where the boy will find it to his advantage in working out ideas of construction.

Object drawing will appeal to the boy if he understands its principles. It may be well for him to be told that "parallel, horizontal, receding edges appear to come together," and it is of some help for him to see a diagram in a textbook or one copied on the blackboard to illustrate this principle. It is undoubtedly better pedagogy for a teacher to actually show how the principle works. The photographs here presented give a clear idea of how perspective may be illustrated.

One reason why object drawing is not given more attention in the grade schools is that it is oftentimes difficult to secure good results from the class generally. It seems that teachers of drawing desire to have more showy work on the part of the students. They spend considerable time drawing flowers, making landscapes and using colors. This kind of work is excellent for the developing of appreciation of the fine arts, but when it comes to drawing objects with understanding of the principles of distance and position, teachers often feel that this is too difficult. However, we will agree that object drawing is most important notwithstanding that it is sometimes difficult to teach.

If it is not presented in its simplest form and in a logical way the student is confused. Hence the work is uninteresting, and this is bound to show. Without going into detail regarding the location of vanishing points on the horizon we can take it for granted that there are such points. This may be developed by the teacher in making an isometric drawing of a cube on the blackboard. The class will readily see that this is not a true representation. The teacher then may change it to more nearly resemble the appearance of a cube. It will be seen in the drawing that the oblique lines on either side of the front vertical edge must come together. The

FIG. 1. THE STRAIGHTEDGES MAY BE SEEN AT THE TOP OF THE BLACKBOARD.

photograph, Fig. 2, shows two straightedges carried to vanishing points. I believe that in teaching perspective the very bigness of this method makes it impressive. The blackboard is free from all other drawing or writing that would be distracting to the student.

In representing any rectangular solid the front vertical edge is drawn first, then the two upper oblique edges of the object nearest to the observer. Fig. 1 shows that the front vertical edge is drawn with a T-square which is slid along the chalk rack. (In this illustration the straightedges are supported by means of a hook above the center of the blackboard where they are kept when not in use.)

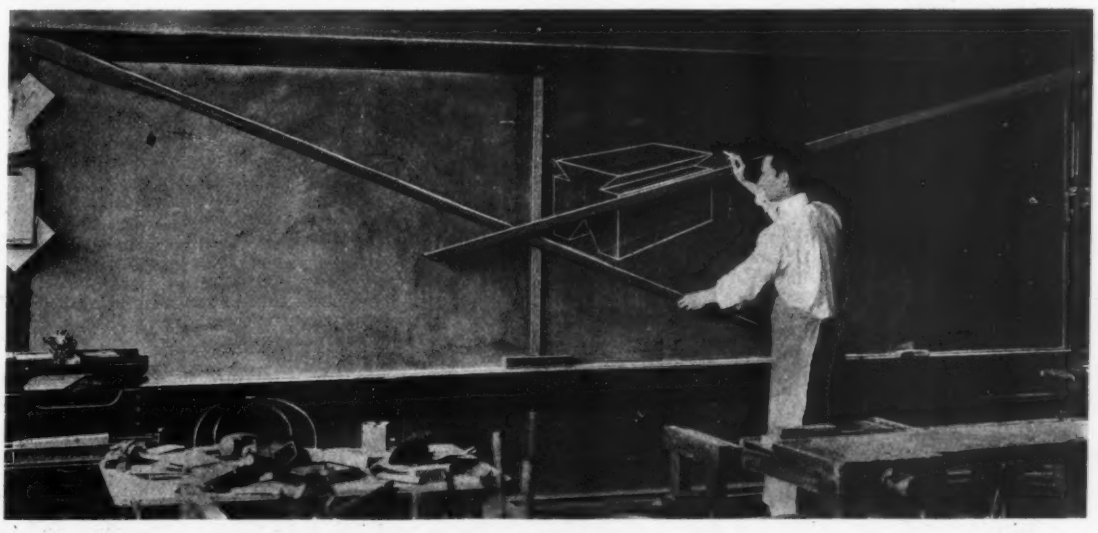


FIG. 2. THE STRAIGHTEDGES IN USE.

In the shop many teachers themselves would prefer to be more proficient in object drawing. These men may be mechanical rather than artistic. There is an interesting field open for them thru the study of mechanical perspective. For all practical purposes, such as arise in the shop, the accompanying photographs give sufficient information for constructing blackboard perspective apparatus:

1. The T-square is used for drawing all vertical lines.

2. The straightedges are used for drawing the principal oblique lines.

3. When thickness is represented by means of the vertical line the length and width are estimated on the oblique lines.

4. To find the center in perspective (taking for example one of the faces of the cube): Draw diagonal lines from the corners.

5. The object may be drawn very lightly at first, then heavier, either mechanically or freehand.

A Course in Automobile Construction, Operation and Repair

(Conclusion)

Harry W. Anderson, Director, Automobile Department, U. S. Army Vocational School, Fort Sill, Okla.

SUGGESTIVE LECTURE OUTLINE.

Trouble Shooting.

1. *Introductory:*
   - (a) Machinery liable to trouble.
   - (b) The internal combustion engine as a piece of machinery.
   - (c) Any abnormal condition is trouble.
2. *Four General Classes of Trouble:*
   - (a) Carburetion.
   - (b) Ignition and electrical system of car.
   - (c) Cooling system.
   - (d) Mechanical (include oiling).
3. *Troubles Due to Carburetion:*

A. Rich Mixture:

Carburetor—what it is—modern carburetor mixing accomplished by stream of air passing a nozzle or jet or multiples of same.

Ideal proportion—what it is—judge carburetor and mixture by performance of engine.

Proportioning air and gasoline at high speeds—how accomplished in various carburetors.

1. Symptoms of rich mixture:
   - Black smoke.
   - Smell of raw gasoline—pungent odor.
   - Reddish yellow flame issuing from cylinder when petcocks are opened.
   - Loping or galloping of motor.
   - Engine overheating.
   - Pre-ignition.
   - Carbon forms rapidly.
   - Pitted valves.
   - Sooted plugs.
   - After-firing (in muffler).
   - Sluggish motor—no pick-up.
2. Causes of rich mixture:
   - (a) Too much gas fed to the carburetor.
     - Too much pressure (pressure system).
     - Float valve stuck open.
     - Heavy float (cork float soaked with gasoline).
     - Punctured float (hollow metal float).
     - Sticking float.
     - Sticking toggle levers.
     - Dirt on float valve seat.
     - Bent needle in float valve.
     - Improper float level.
   - (b) Too much gas fed thru the carburetor.
     - Faulty adjustment of the needle valve.
     - Needle valve seat worn or improper seating of the needle valve.
     - Air valve spring too tight.
     - Improper jets (Zenith).
     - Venturi tubes too small (Zenith and Stromberg).
   - (c) Too much gasoline in the cylinders.
     - Too much priming.
     - Primary air passage obstructed.
     - Vacuum system—suction valve open from heavy float other cause thus letting gas into suction pipe from intake manifold.
3. Remedies (explain according to causes):
   - Explain remedy for soaked cork float.
   - Explain remedy for punctured metal float.
   - Explain setting of float level (general rule for nearly all carburetors, float level about one-eighth inch lower than jet or nozzle hole).
   - Clean jets by blowing compressed air thru them.

B. Lean Mixture:

1. Symptoms—Misfiring, coughing, popping, and backfiring in the intake manifold and carburetor.
2. Causes of lean mixture.
   - Too little gas fed to the carburetor.
     - Break or leak in gas line.
     - Gas supply exhausted.
     - Gas supply valve closed or nearly closed.
     - Stopped gas line.
     - Water in gas or float chamber. Also ice.
     - Tank air bound (gravity system).
     - Too little pressure (pressure feed).
   - Too little gas fed thru the carburetor.
     - Float level bent shutting gas off too soon.
     - Dirt in carburetor stops flow thru jets.
     - Needle valve adjustment faulty.
     - Carburetor float or toggle levers sticking.
     - Spray nozzle too small.
   - Air leaks.
     - Air valve spring too loose.
     - Air valve stuck open.
     - Loose carburetor flange.
   - Leak in manifold.
     - Leaks at gaskets, plugs, compression cocks, valve stems.
3. Remedies:
   - Repair leaks in gas supply line.
   - Fill tank with gas.
   - Open gas supply valve.
   - Eliminate the water from the tank, gas line and carburetor.
   - Change and test float level.
   - Change needle valve adjustment.
   - Blow out jets.
   - Change tension on air valve spring.
   - Repair leaks at carburetor flange.
   - Repair leaks at intake manifold.
   - Repair leaks at gaskets.
   - Tighten plugs.
   - Put in valves with oversize stems.

C. Backfiring.

1. How caused. How differs from after-firing.
   - Slow burning of weak mixture (still burning when valve is opened on next intake stroke).
   - Late explosion.
   - Spark improperly timed so comes on intake stroke.
   - Intake valve slightly open.
   - Leaky or warped valve.
   - Premature ignition.
   - Symptoms of lean mixture show up when starting cold motor. After motor is warmed up motor runs O. K.

D. Adjusting Carburetor:

Warm motor—retard spark—throttle not over half open—adjust needle valve.

Advance spark—open throttle—adjust auxiliary air valve.

Try on road and make further adjustments while car is running along road.

Typical rules for adjustment:
Stromberg—Warm motor—spark well advanced—throttle half open or more—set high speed adjustment.
Spark retarded—throttle closed—make low speed adjustment.
Schebler Model R—Warm motor—set spark retarded—throttle almost closed. Adjust low speed.
Advance spark—throttle open—adjust high speed, or auxiliary air valve.

E. Smoke Issuing From Muffler:
Black, Grey, Light blue }
How caused.

F. Analogy of External and Internal Combustion Engines.
Composition of gasoline, H & C (a mixture of chemical compounds rather than a definite chemical compound).
Carburetion and combustion.
Definition of combustion.

A FORD RUNABOUT REBUILT IN A SCHOOL SHOP.

Comparison of correct and incorrect combustion.
1 lb. Air }
7 lb. Gas }
CO—4,500 B. T. U.
(Emphasize loss of heat values and consequent loss of power from incorrect combustion.)
1 lb. Air }
10-15 lb. Gas }
CO_2—14,400 B. T. U.
Products of combustion.
CO or CO_2
H_2O

G. Necessity for Conservation of Petroleum Resources.

H. Conclusions:
Only two adjustments of carburetor required.
Summer—Slightly lean mixture preferable.
Winter—Slightly richer.
No adjustment of carburetor should be attempted until sure that ignition system is O. K.
Only proceed with carburetor adjustment with definite rules.

TROUBLE SHOOTING OUTLINE.

Ignition.

I. *Introductory.*
(a) Ignition as a source of trouble.
(b) Ignition systems:
Battery.
Make and break.
Jump spark.
Low tension magneto.
High tension magneto.
Battery and generator.

II. *Two Ways of Tracing Trouble:*
(a) From spark plugs to source of current.
(b) From source of current to plugs.

III. *Causes of Trouble in Ignition System:*
A. Spark plugs.
1. Cracked porcelain or oil soaked.
2. Sooted.
3. Incorrect gap .025 average (use AC gauge, not worn dime unless know thickness to be .025.) Dixie magneto .020.
4. Plugs not compression tight.

B. Terminals.
1. Loose—from strain or vibration.
2. Corroded.

C. Chafed wires.
1. From rubbing against motor head.
2. Cooked wires.
3. From fan belt (Ford).
4. Ground wire from magneto breaker head to switch.

D. Distributor.
1. Disc dirty.
2. Distributor plate cracked (magneto).
3. Brushes defective.
4. Broken rotor button.
5. Button out.

E. Contact Breaker.
1. Wrong adjustment of points—too far apart—too close together.
2. Points dirty, black or pitted.
3. Points worn.
4. Stationary block insulation gone.
5. Magneto points sticking in wet weather from swelling of fibre block.
6. Clockwise breaker on anti-clockwise magneto and vice versa.

F. Magneto collector ring and brush.
1. Brush track dirty.
2. Insulation broken down because of safety gap or points too far apart.
3. Oil soaked insulation.

G. Condenser.
1. Defective—noticed by arcing and heating of break points, also weak spark.

H. Magneto armature.
1. Short circuits.
2. Open circuits.
3. Oil soaked.
4. Rubbing of windings against pole pieces.

I. Magnets.
1. Weak.
2. Reversed.

J. Magneto Safety Spark Gap.
1. Defective.

K. Battery troubles.
1. Dry cells.
(a) Shorts.
(b) Zinc shells on contact.
Material of box containing cells, metal instead of wood.
Terminals touching.
Moisture in container.
(b) Loose terminals.
(c) Dead cells.

2. Storage batteries.
   (a) Corroded terminals.
   (b) Chafed wires—rubbing against battery sling, frame or body box.
   (c) Internal short circuits.
   (d) Frozen battery.
   (e) Buckled plates from overcharging and overheating.

IV. *Remedies—Outline as Listed Under Troubles.*

TROUBLE SHOOTING OUTLINE.
Cooling System.

I. *Introductory.*
   A. Sometimes sign of malfunctioning of carburetor and ignition system.
   B. Cooling system at fault.
   C. Cooling system troubles, caused by engine or other sources.

II. *Cooling System Trouble Due to Carburetor.*
   A. Over rich mixture. Adjust carburetor.
   B. Too lean mixture. Adjust carburetor.

III. *Cooling System Trouble Due to Ignition.*
   A. Spark timed wrong. Time spark.
   B. Detached timer mechanism or control rods.
   C. Retarded spark—advance.

IV. *Cooling System Faults.*
   A. Insufficient water. Fill radiator.
   B. Leaky radiator. Repair and keep radiator filled.
   C. Low water level in Thermo-syphon system.
   D. Failure of water to circulate:
      1. Defective pump—clogged or pin sheared. Repair.
      2. Obstructed radiator.
      3. Obstructed hose.
      4. Clogged water jackets.

   Clean system thoroughly.
   E. Fan belt off, broken or loose. Repair.
   F. Radiator full of mud between tubes. Clean.
   G. Cold weather—water in lower radiator frozen. Cover lower part of radiator with a piece of cardboard.

V. *Other Causes.*
   A. Insufficient lubrication. Investigate lubrication.
   B. Wrong grade of lubricating oil. Consult oil companies' booklets.
   C. Brakes dragging. Adjust brakes.
   D. Green engine not thoroly run in. Run engine slowly.
   E. Valves out of time. Check up timing of valves.
   F. Valves not seating properly. Grind or check up clearance.
   G. Running on low gear too long.
   H. Carbon on cylinder head or piston. Remove head and clean carbon.
   I. Clogged muffler or exhaust pipe. Clean thoroughly.
   J. Running on low, with the wind and heavily loaded.

TROUBLE SHOOTING OUTLINE.
Mechanical Troubles.

I. *Introductory.*

II. *Loss of Compression and Power.*
   A. Loose spark plugs. Tighten.
   B. Loose relief cocks. Tighten.
   C. Loose valve caps.
   D. Leaky piston rings. Replace with leakproof rings.
      1. Rings carbonized. Gummed in recesses.
      2. Rings worn out, broken rings.
      3. Ring cuts in line.
      4. Rings losing tension.
   E. Warped valves.
   F. Valves leaking—held open by not enough clearance between stem and tappets.
   G. Scored cylinders.
   H. Loss of power from slipping clutch.

III. *Engine Knocks.*
   A. Overheated engine.
   B. Lack of lubrication.
   C. Loose valve tappets or push rods.
   D. Loose rocker arms (overhead valves).
   E. Too much clearance—tappets or push rods.
   F. Carbon in cylinders.
   G. Too rich mixture.
   H. Loose bearings.
      1. Crankshaft.
      2. Connecting rod.
      3. Wrist pin.
      4. Cam shaft.
   I. Crankshaft end play.
   J. Wind and unwind of crankshaft on six cylinder engines.

INDUSTRIAL-ART WORK OF NEW YORK CITY HIGH SCHOOLS.

Three cases arranged by girls of the Brooklyn high schools at an exhibition in the Brooklyn Institute Museum. The entire work of designing the garments, selecting and buying the materials and making the garments was done by the girls.

K. Piston slap.
L. Advanced spark on heavy pull.
M. Loose flywheel.

Note. In considering motor troubles consult:

Vacuum Oil Booklets Nos. 1 and 2. Pratt, pp. 183-194.
Hobbs & Elliott, pp. 427-452 inclusive.
Phillips, pp. 99-102 inclusive.
Page, J & A, pp. 503, 533, 671, 674.
Dyke.
Audel's Guide.
Motor Vehicles.
Marvel Carburetor company's service chart.

Charts by Page:

1. Gasoline Engine Troubles Made Easy.
2. Location of Ford Engine Troubles Made Easy.
3. Location of Carburetion Troubles Made Easy.
4. Location of Ignition System Troubles Made Easy.
5. Location of Cooling and Lubricating Troubles Made Easy.

ELEVENTH ANNUAL MANUAL ARTS CONFERENCE AT INDIANAPOLIS.

The United States Commissioner of Education has issued a call for a Conference of Men Engaged in the Training of Teachers of Manual Arts and Industrial Education, to be held in co-operation with the University of Indiana, at Indianapolis, December 9, 10 and 11.

The headquarters of the conference will be at the Hotel Severin. The program which provides for one single topic at each session, embraces the following:

First Day, Occupational Analysis and Preparation of Industrial Teachers; *Second Day*, Relation Between School and Industry, Junior Employment Service, Manual Arts in the Intermediate or Junior High School, and Special Problems of the Part-Time Teacher; *Third Day*, Occupational Training in the Army, and the Summary of the Activities of the Conference.

Each leader has been asked to prepare distribution copies, outlining the ground to be covered, and where the nature of the subject permits, formulating definite propositions, or theses, for the consideration of the Conference. Mr. W. T. Bawden will preside.

MEETING OF NEW YORK STATE TEACHERS' ASSOCIATION

An unusually interesting program on industrial and art education was given this year at the Seventy-fifth Annual Meeting of the New York State Teachers' Association held at Rochester on Tuesday, Wednesday and Thursday, November 22, 23 and 24. Mr. James F. Barker, Assistant Superintendent of Schools at Rochester, acting as chairman of the General Meeting of the combined Fine, Industrial and Household Arts Section, held on Tuesday morning, introduced Owen R. Evans, State Director of Industrial Education of Harrisburg, Pa., who spoke on "The Social Point of View in Part-time Education," Mr. George L. Herdle, Director of the Memorial Art Gallery, of Rochester, spoke on "Present Tendencies in Painting," and Anna M. Richardson of the Federal Board for Vocational Education, Washington, D. C., discussed Homemaking Education.

Tuesday afternoon was given over to the meetings of the sections on Industrial Art and Household Arts Education. The Industrial section was in charge of Stewart F Ball, Supervisor of Manual Training at Buffalo. H. H. Stewart, Director of Industrial Arts, Mount Vernon, discussed "Industrial Arts in the Junior High School." His paper was commented on by C. C. Bush, Director of Industrial Arts, Olean, N. Y. "The Organization of Evening Industrial Classes" was the subject of a paper read by Morris Siegel, Director of Evening and Continuation Schools, New York City. William J. Small, Director of Industrial Education, Niagara Falls, discussed this paper.

The following program was introduced by Leon L. Winslow, State Specialist in Drawing and Industrial Training, Albany: "Art and Industrial Arts in the Elementary School," by Mrs. Lois Coffey Mossman, Teachers College, Columbia University; "Art Education and Industrial Demand," by Richard F. Bach, Associate in Industrial Arts, Metropolitan Museum of Art, New York City; "Developing a Market for High School Art," by Margaret Giesecke, Technical High School, Buffalo, and "A New Process in Advertising Art," by Rose Acker of the Shaefer Ross Company of Rochester. Mrs. Mossman's paper was discussed by Charles B. Bradley of Buffalo Normal School and Lillia M. Olcott of Cortland Normal School; Mr. Bach's paper by Royal B. Farnum, President of Mechanics Institute, Rochester, and Miss Acker's paper by Harry W. Jacobs, Director of Art and Handwork, Buffalo. Miss Giesecke brought with her an exhibit of craft products turned out at the Tech Studio, a co-operate students' establishment for the purpose of making a more complete correlation between school theory and its commercial application.

The following program was in charge of Mae B. Benedict, Head of the Household Arts Department, Mechanics Institute, Rochester:

Household Arts in the Junior High School, Anna M. Cooley of New York; Community Service and the Homemaking Teacher, Agnes H. Craig, Supervisor of Homemaking Education; The State-aided School and the Home Project, Marion S. Van Liew, Specialist in Vocational Education for Girls, State Department of Education, Albany.

MR. BEN W. JOHNSON,
Wilmington, Del.

BEN JOHNSON GOES TO DELAWARE.

Mr. Benjamin W. Johnson, formerly western agent for the Federal Board of Vocational Education at Seattle, Wash., has recently become Director of the Department of Vocational Education at Wilmington, Del.

Previous to accepting the appointment with the Federal Board, Mr. Johnson was Director of Industrial Education in the Seattle Public Schools. During that time he caused the department to grow from two to 56 teachers, and the work was enlarged to include all grades from the elementary thru the high school.

Mr. Johnson resigned in September, 1917, to accept an appointment on the staff of the Federal Board, which was at that time under the leadership of Dr. Prosser. His territory was the Pacific Coast region, embracing the seven states of Washington, Oregon, California, Arizona, Nevada, Utah and Idaho.

In September, 1920, Mr. Johnson resigned from the federal agency to accept appointment as Director of Vocational Education at Wilmington. The Delaware position is a combined one of State Supervisor of Trade and Industries, and Director of Trade and Industrial Education for the City of Wilmington. The city position has been created and combined with that of the state to better develop a progressive program of industrial education.

In his new work, Mr. Johnson has been placed in charge of an extensive vocational program, embracing part-time, co-operative and evening classes in vocational training, the establishment of a Day Trade School as a part of the Wilmington high school, and the inauguration of all phases of vocational work.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

HAND FORGED POCKET KNIFE.

Jay F. Knowlton, Junior College Shop Instructor, Hibbing, Minn.

A pocket knife that can be made by a boy in the school shop, and still be a knife that is worth owning, is a problem hard to find. Here is one, however, that works out very well, and one that is enough out of the ordinary, to interest the most skeptical boy. It also has some very good points in its favor as a problem, such as, the working of spring steel and tool steel together, the tempering of each, the fitting of the blade to the handle, and blind riveting that will allow the blade to work in the handle.

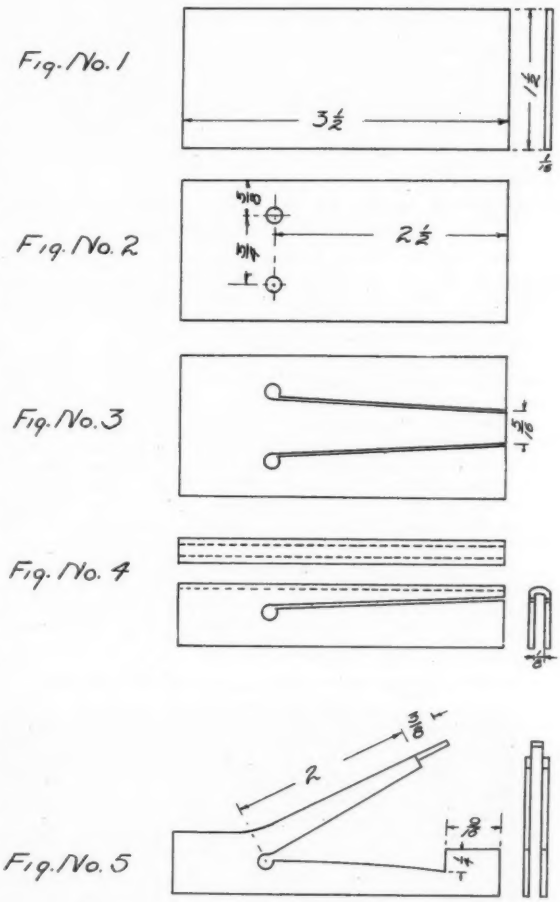
The stock to be used for the handle should be a good grade spring steel $\frac{1}{16}$ of an inch thick, $1\frac{1}{2}$ inches wide and $3\frac{1}{2}$ inches long. Such steel can be purchased from the supply houses in large sheets, and if possible, it should be obtained in the annealed state. If such is not possible, it can be handled very well in the unannealed state. This spring steel cuts very easily in a hand power shear, or when placed in the vise and cut with a cold chisel. This can be done cold, but care should be used in cutting any sheet steel in this manner as it is very liable to crack unless the cut is stopped in a drill hole. Any chisel mark left from this cutting will cause a crack when the steel is tempered. Be sure to remove all marks of such with a file before you attempt to harden. Should you not be able to find a piece of spring steel as described take a small piece of an old automobile spring and draw it out to the thickness required. This works very well except in tempering when it is necessary to experiment with it a little to obtain the best method, and to learn the grade of steel you have picked up.

As soon as your spring steel for the handle is cut to size and annealed; by allowing it to cool from a red heat while buried in lime, it should be marked as shown in Fig. 2. The drill holes should be marked with a center punch and drilled with a $\frac{3}{32}$ drill. Now mark out the line on which to cut as shown in Fig. 3, place the piece in the vise and cut with a cold chisel starting from the outside. This will leave the work out of true and it can be heated and straightened on the anvil.

To cut this sheet steel in a vise with a cold chisel it is necessary to have the jaws of the vise parallel and a good thin sharp cold chisel. Place the steel to be cut in the vise with the line to be cut, and the top of the jaws coinciding. Now hold the chisel at an angle so that the back jaw of the vise will act as one cutter; the chisel, the other. This cutting angle should be very small so as not to bend the part above the vise any more than is necessary. If the jaw of the vise is in good condition, a very good cut can be made. Care must be used to stop the cut before a mark is made on the inside of the drill hole.

The handle can now be folded by first starting the bend with the cross piece hammer while holding the steel over the step on the anvil. Now place a $\frac{1}{8}$ piece of steel in the center of the bend and using it as a form, bring the handle to the shape shown in Fig. 4.

Next cut the opening in the handle, which will allow the spring to be bent down while tempering, to a position lower than it will take when working. This gives the spring a chance to set before it comes to its working position. This is done by first heating the handle and raising the spring to position as shown in Fig. 5. Now cut the portion out, as shown, with a file. The length of the spring must now be marked, using dividers to get the



correct length that will allow it to work in the opening you have just cut. This length should be marked a little long at first and then fitted, when bent, to position. After marking, file the end of the spring to size and shape shown, which will make the tongue $\frac{1}{8}$ of an inch wide. Now bend the spring to its position, but do not fit it until you have put the slight curve in the frame, as shown in Fig. 6. The spring can now be fitted and the handle trimmed as shown in Fig. 6.

The blade should be made from a very good grade of tool steel. This should be better than the regular cast steel grade, and it can be purchased from any of the steel companies in sizes to suit, or it can be purchased in sheet form. The piece to be used for the blade should be $\frac{1}{8}$ inch thick, 9-16 inch wide, and 3 inches long, from which the blade can be filed to shape and size, as shown in Fig. 7, and detailed drawing No. 11. It will be noticed that the end thru which the hole is drilled, for the rivet, is $\frac{3}{8}$ inches square. Directly in the center of this square a $\frac{1}{4}$-inch hole is drilled.

The filing of the part shown in Fig. 11 is perhaps the most important part of the work. It is this part that makes the blade fit the handle. This drawing will work well if

Fig. No. 6.

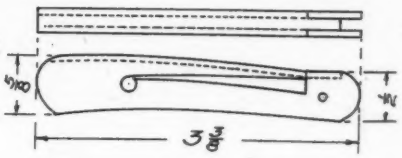


Fig. No. 7.

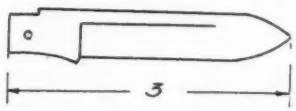


Fig. No. 8.

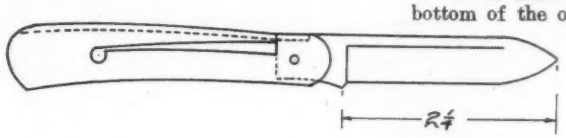
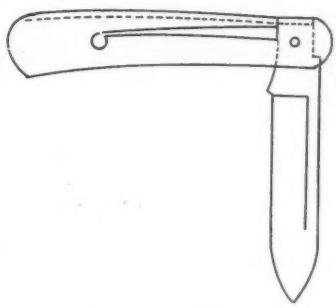


Fig. No. 9.



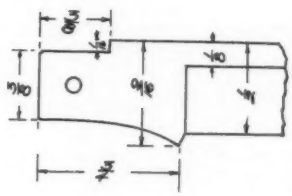
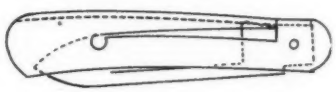
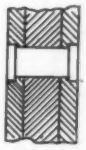


Fig. No. 11

Fig. No. 10.





Section Showing Rivet.

The Knife as made by a student.

(This Knife is slightly larger than the one suggested in the drawings.)

Fig. No. 12.

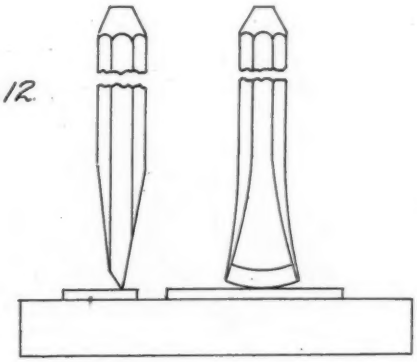
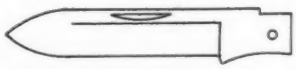


Fig. No. 13.



the handle has been given the curve shown. If the handle is a little straight this blade will not be covered by the handle but will project above. Should such be discovered before this part of the blade is filed to size, the correction can be made by moving the $\frac{3}{8}$-inch square nearer the bottom, making a wider cut on the top and less curve at the bottom. However, keep the square $\frac{3}{8}$ inches. If this corection is made, a portion of the blade will project above the handle, which can be trimmed off.

The rivet hole in the handle is marked from the hole in the blade. Place the blade in position on the outside of the handle, making sure that it is so placed that when the knife is finished, and blade open, that the blade and handle will be straight. To make sure of this point, the blade can be placed back a little more than is necessary, say a 1-32 or 1-64 inch, and the end of the spring can always be trimmed a little to let the blade take its proper position. Now mark the location of the rivet hole on the handle, drill with the $\frac{1}{8}$-inch drill and counter sink half way thrú each side with the 9-64 inch drill as shown in the section drawing. You are now ready to temper both.

First heat the handle and bend the spring to the bottom of the opening filed, and let it cool so as to relieve any strain there may have been formed. When it is cold, re-heat to a very low red and quench in oil until cold, then polish and draw to a blue color. The drawing can be done by first polishing it, then holding above a large red hot iron, or over the forge fire without draught, but the former will give better results to the student.

The blade is tempered in about the same way, except it is hardened at medium red and drawn to the first shades of blue. This must not be done, however, until you have cut the thumb nail hole as shown in Fig. 13. To do this, heat the blade to a dull red, place it on the anvil, and with the special tool shown in Fig. 12, cut the hole. Be sure to cut the hole on the right side of the blade, to make it a right-handed knife. Now straighten the blade, anneal and temper.

The handle and blade are now polished, placed together, blade open, with the soft steel rivet in place. Now place one piece of heavy paper between the blade and handle on both sides and rivet. Then work the blade until the paper wears out, when the blade will work freely.

MAKING A CHECKER BOARD.

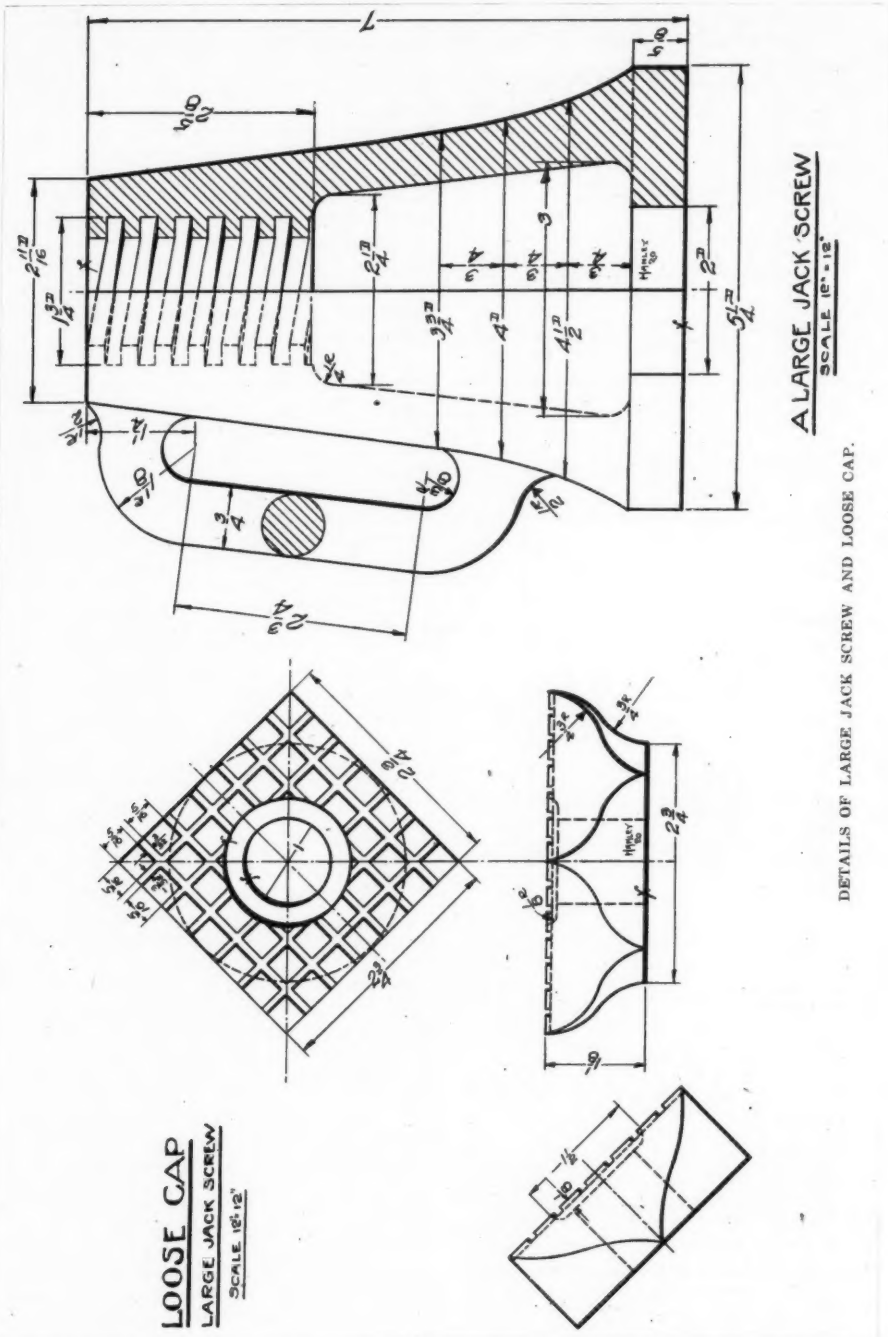
Geo. W. Berg, Bay View High School, Milwaukee, Wis.

The making of a checker board is a problem which always causes a great interest both in and outside of the manual training room, and one which requires accurate workmanship and careful gluing. There are several methods which one may use in constructing a checker board and the writer wishes to submit the following scheme or method which he has tried and found to work out very satisfactorily with high school boys.

1. Get out the following stock:

4 pieces 1x1⅝x14" black walnut.

4 pieces 1x1⅝x14" maple.



DETAILS OF LARGE JACK SCREW AND LOOSE CAP.

4 pieces ¾x2x17″ mahogany.

2. Pass the black walnut and maple pieces thru the planer on edge, planing to 1½″ in width. (Alternate cuts.)

3. Carefully glue maple and walnut pieces alternatingly. First glue two at a time, then four, and then eight. (Use blocks of scrap wood to protect glue edges. Heat pieces before gluing. Use hot glue and let pieces stand for at least ten hours.)

4. Scrape off all surplus glue and pass pieces thru the planer to ¾″ thick. See Figure 1.

5. Cross-cut saw stock to pieces, 1½″ in width. See Figure 2.

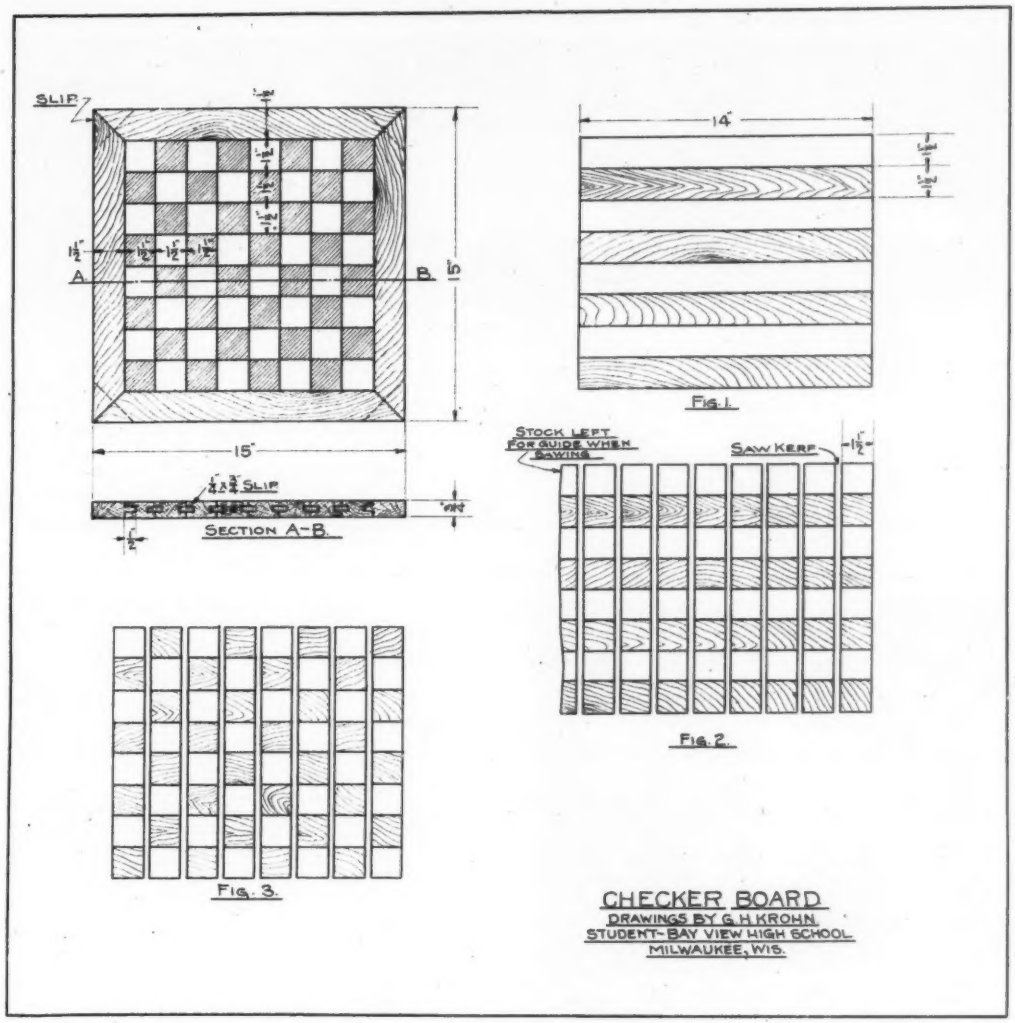
6. Turn every other piece end for end and glue. (Before gluing cut for slip ¼″ thick and ¾″ wide. This is done to make a stronger glue joint and to prevent slipping when gluing.) See Figure 3.

7. After glue has set hand plane both surfaces. Cut groove for mahogany moulding and scrape and sandpaper board.

8. Tongue mahogany moulding, cut mitre joint and glue in place.

9. Plane moulding to the same thickness as the board, scrape and sandpaper.

10. For a finish, rub with oil and white shellac.



DETAILS OF CHECKER BOARD.

A LARGE JACK SCREW.

E. C. Hanley, Muskegon, Mich.

The construction of the pattern for a large jack screw is simple. It forms a two part or split pattern. After the body has been turned to shape, the handle is formed from two pieces of stock which are bradded together and shaped as one piece. The ends of the handles are made extra long and recesses are cut in the body of the pattern to receive the ends.

FLOWER CORNUCOPIA.

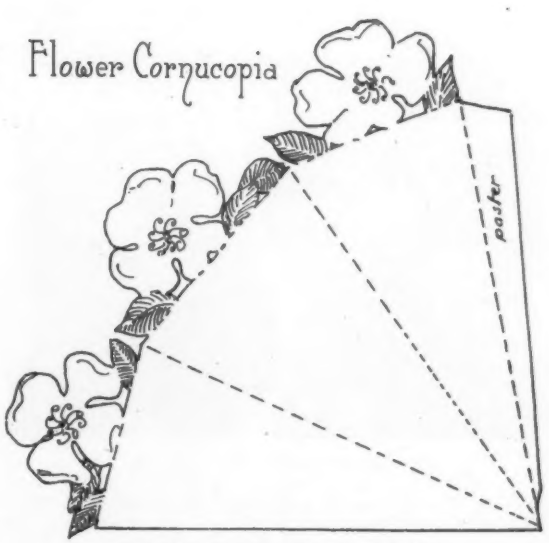
Eunice Bissell, Des Moines, Iowa.

This little dinner favor may be made of any available drawing paper or light cover stock. The cup proper may be made 5 inches long and the flowers approximately 1½ inches high. The flowers are outlined with India ink and colored with water color. After pasting the lap in place, bend the leaves outward at a sharp angle.

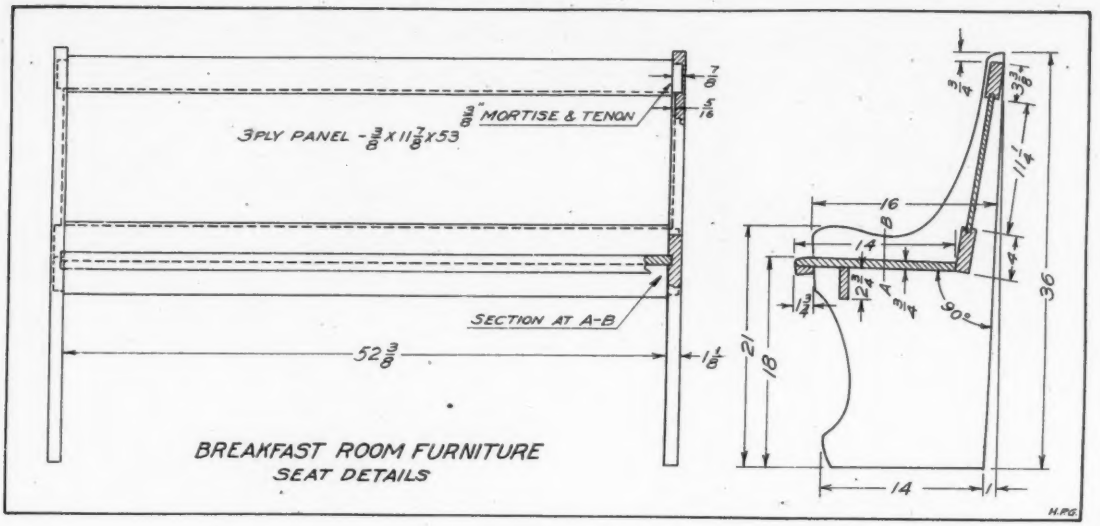
BREAKFAST ROOM FURNITURE.

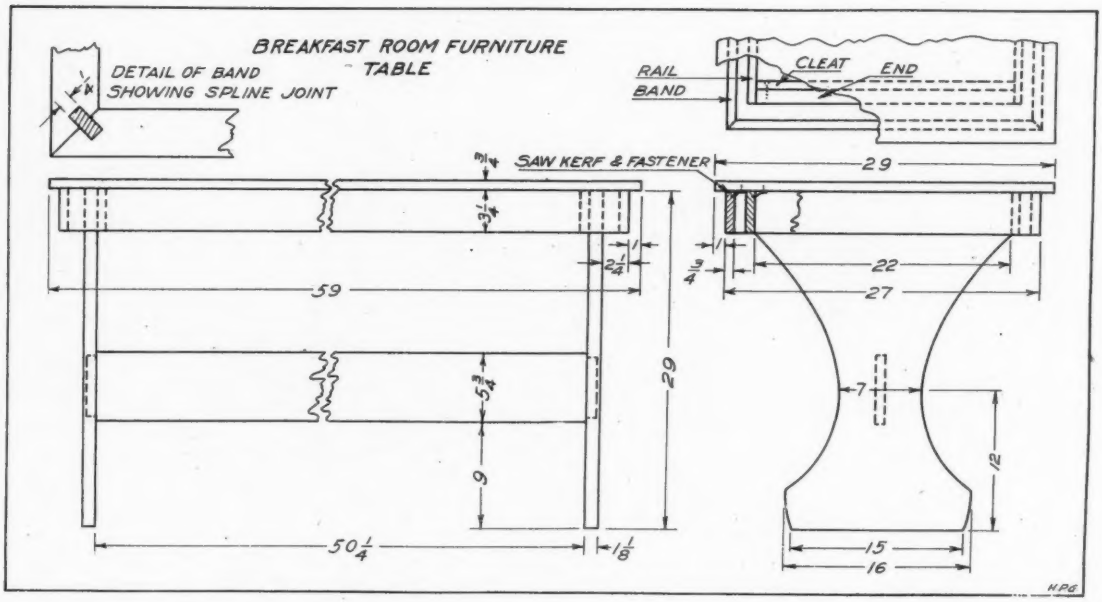
H. P. Gerber, Director Wood Working Branches, Northern Normal and Industrial School, Aberdeen, S. D.

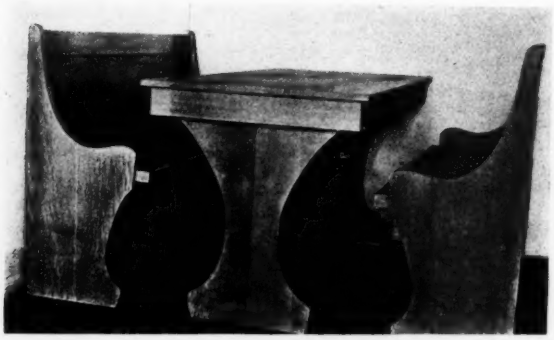
The accompanying half tone and drawings represent a style of movable furniture that has some advantages over the built-in type. The pieces can be completed and finished in the shop, it has the built-in appearance when installed, and being fitted with glides it is easily moved to facilitate cleaning the room.



DETAILS OF FLOWER CORNUCOPIA.

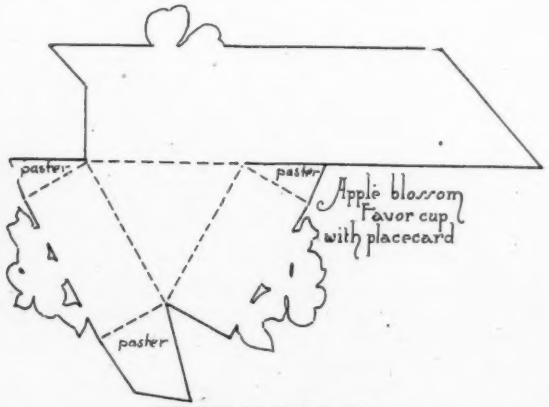






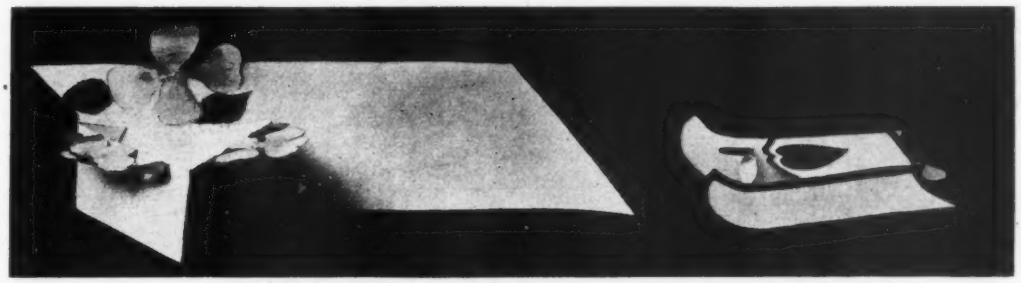
THE FURNITURE READY FOR USE.

The offset of one inch at the rear of seats was made to allow for base board and moulding. The dado to fit the seat was cut at right angles to the back, thus giving the seat a slight tilt.



DETAILS OF FAVOR CUP.

Quartered oak was used thruout and finished in a light grey shade as follows: One coat dilute Bridgeport



FAVOR CUP AND PLACE BOX.

SLED SHAPED BOX.

acid stain, standard grey, sanded smooth with 00 paper, followed by one application of same stain full strength. To produce the silver grey effect the surface was then filled with a mixture of aluminum powder, a little linseed oil, and turpentine. A portion was treated and rubbed off with burlap and waste to prevent the setting of filler on the surface. After 24 hours a thin coat of white shellac was applied and later rubbed smooth with fine sandpaper or steel wool. The final finish may be either wax or flat varnish. Marietta French lacquer works well.

A SLED BOX.

Miss Catherine Richter, Des Moines, Iowa.

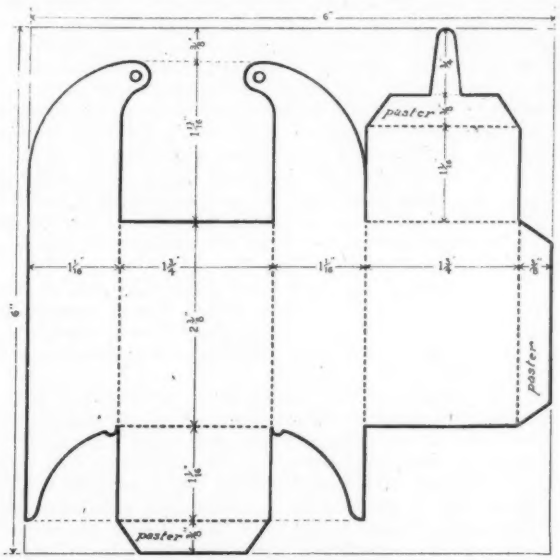
This little box can be used as a Christmas tree ornament or as a dinner favor. It is made of heavy drawing paper, but can be constructed of any medium-weight construction paper or even of light tag board.

The drawing shows the dimensions which make a satisfactory box. Any design may be painted with water colors to outline the runners and to decorate the top.

A FAVOR CUP.

Eunice Bissell, Des Moines, Iowa.

This little cup will serve both to hold favors and as a place-card for a luncheon. It may be made of heavy



DETAILS OF SLED SHAPED BOX.

drawing or construction paper and may be colored to suit the fancy of the maker. In the example illustrated in the photograph the blossoms were pink and the background of leaves was indicated with green.

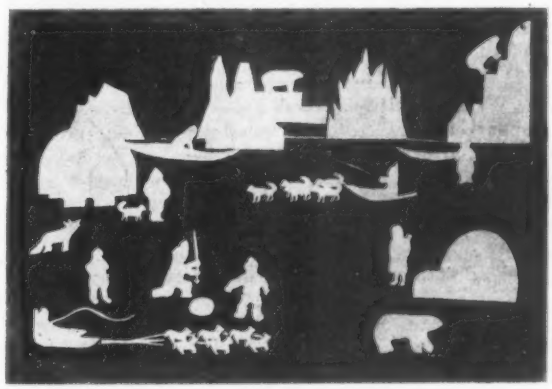
COMMUNITY POSTERS.

Grace W. Engels, Newark, N. J.

It will be found that the child has a much more intelligent idea of the geography or history lesson if he is allowed to represent those things that he has been talking about with cut paper. The aim should be of a simple representation of the child's idea of a particular thing and therefore details should be avoided. Silhouettes are most effective for this as the child is not confused by many small cuttings.

I have found that the community poster brings forth more enthusiasm and interest than the individual poster.

Many intelligent questions are asked by the children when cutting and placing the objects on the poster that lead to discussion on many important phases of the work that have been overlooked when the lesson was taught.



ONE OF THE COMMUNITY POSTERS.

The basis for these posters were pictures and stories presented to the class in which the habits and customs of the people were brought out. After being retold by many members of the class, the individual freehand cuttings were made and a selection was made by the class for the community poster.

The backgrounds used were sheets of dark blue and black papers 36″ by 24″ in size and the cuttings were made of cheap white paper. Altho the better cuttings were selected, every member of the class was represented in some way so as to make a real class project.

HOW TO TELL BIRCH, BEECH, AND MAPLE

Birch, beech, and maple are very similar in appearance, and have approximately the same weight. Hence it is comparatively easy to mistake one of them for another. A method which anyone can use to distinguish them is suggested by the U. S. Forest Products Laboratory. The method makes use of the relative width of the pores and medullary rays in the three woods.

If the end grain of birch, beech, or maple is cut smooth with a sharp knife and examined with a hand lens, the pores will be seen as tiny holes distributed fairly evenly over the surface, and the medullary rays will appear as narrow lines of a different shade running at right angles to the growth rings.

In beech some of the rays are very distinct even without a lens. The large rays are fully twice as wide as the largest pores.

PART OF POSTER EXHIBIT PREPARED BY PUPILS AT MUNHALL, PA. PREPARED UNDER DIRECTION OF SUPT. C. R. STONE.

In maple the rays are less distinct, and the largest are about the same width as the largest pores.

In birch the rays are very fine, invisible without a lens. The pores are several times larger than the rays, usually being visible to the unaided eye as minute holes on the end grain and as fine grooves on dressed faces of the board. The pores in birch are considerably larger than the pores in beech or maple.

The appearance of the medullary rays on a "quartered" surface is also distinctive. Here they appear in beech as distinct "flakes", the largest being between one-sixteenth and one-eighth inch in height when measured along the grain of the wood. In maple they are considerably smaller, rarely attaining a height of one-sixteenth inch. In birch they are comparatively inconspicuous.

AN INTERESTING HEALTH EXHIBIT.

The schools of Munhall, Pa., with the co-operation of the State College, held an interesting health exhibit this year. The exhibit, which took the form of a "drink more milk campaign," consisted of displays of sample meals. Illustrated talks on nutrition were given to interested groups of students. A prize poster competition was conducted under the direction of the art supervisor and generous prizes were given by the local milk companies. Some of the posters read: Better Food, Less Expense; An Apple a Day Keeps the Doctor Away; One Quart a Day Will Keep the Doctor Away; Safest Food for Children; Drink at the Fountain.

SECTION OF HEALTH EXHIBITION AT MUNHALL, PA.

Groups of parents were in charge of the preparation of "model" meals which held the interest of both cooks and visitors. The largest attendance of patrons was that for the concluding program of the afternoon.

A contest for the best made-over garments, in the interest of thrift, also took well.

IMPORTANT EDUCATIONAL PROGRAM IN ILLINOIS.

The Industrial Division of the Illinois State Board of Vocational Education, during the past year, has promoted the establishment of part-time continuation schools, part-time trade extension schools and evening trade extension schools. The part-time continuation school is the most important of the above three types of schools, not merely because the law requires that boards of education shall establish such schools or classes, but because of the valuable service which they render the state.

Part-time continuation schools may be established under the optional mandatory law which makes it possible for boards of education to establish a continuation school, and to compel attendance of all persons between the ages of 14 and 16 years who do not attend full-time schools.

Part-time schools must be established in 1921 in districts where there are at least twenty minors between 14 and 16. The upper age limit is gradually extended to 18 years in 1923, so that more and more school districts will be included in the provisions.

It is requested that before boards of education begin to plan for more classrooms and additional equipment, that they take a census for the purpose of obtaining information about (a) each child, (b) the number of children expected to attend in 1921, 1922 and 1923. This information is recorded on a census card which lists the name and birthplace of the child, the names of the parents and occupation of father, street address, school district, date of child's birth, age at last birthday, school attended, grade reached in school, cause of non-enrollment, where employed, name of employer, and kind of work performed.

The following thirteen districts have formally voted to establish continuation schools under the "optional-mandatory" law: Aurora, east and west sides; Bloomington; Chicago; Cicero township high school; Eldorado township high school; Galesburg; Granite City community high school; Joliet township high school; Lawrenceville township high school; Peoria; Rockford; Springfield.

Teacher-training centers are planned thruout the state for the purpose of giving teachers in part-time schools some special instruction to assist them in fully appreciating and understanding the special problems of these schools. The training centers will be located at points that will best serve the interests of cities conducting part-time schools this year.

THE MIDDLE WEST ASSOCIATION IN MINNEAPOLIS, FEBRUARY 9, 10 AND 11, 1921.

The Vocational Education Association of the Middle West has a paid membership of more than 600. They come in goodly numbers from all the middle states, with a few from practically every state.

Most of these members, already familiar with the spirit and quality of this Association and its programs, will attend the Minneapolis meeting without fail. And there will be hundreds of new members from the Great Northwest seeking the assistance of this notable meeting and bringing fresh messages and enthusiasm from their particular section.

This is the first time in recent years that an organization of national significance has held its meeting in a convenient place for the interested people of Canada. Advance information comes that Canada will send a large delegation with an interesting message for vocational workers in the United States.

Under the rapid-fire and enthusiastic leadership of Mr. Edwin A. Lee of the University of Indiana, the best program in the history of this organization is in process of construction. Already sufficient arrangements have been made to indicate that this year's program will equal any program ever given in this country on the subject of Vocational Education. National figures from both Canada and the United States will have places on the program and will present such matters as should not be missed by any school, industrial, or commercial people who are interested in training for workers and especially by those who have the responsibility of putting it into operation.

Vocational people, especially in the Middle West and the Northwest, should immediately get in touch with Chambers of Commerce, Women's Clubs, Rotary Clubs, Welfare Organizations, Labor Organizations, etc., and urge them to send official delegates to this great meeting. There will be something going on all the time of vital interest to all these groups.

In the preparation of the program, particular care has been used in securing speakers who can bring authoritative messages to the various school people, labor representatives, agricultural groups, those interested especially in the work of women and girls, child labor specialists, truancy and attendance officers, etc., etc.

It goes without saying that this will be the great opportunity for superintendents and principals of schools to secure aid in the solution of some of the pressing problems that are now facing them in the execution of the new legislation on vocational education and part-time schools. The specialists in all these various fields of education should bring this opportunity strongly to the attention of their school administrators and urge their attendance.

One significant indication of the importance of this meeting is the fact that the commercial establishments very early contracted for all the available space for commercial exhibits in the headquarters hotel. These represent commercial interests from every section of the country.

It will be a great meeting in Minneapolis and every person who can possibly attend should be there for the entire session. Meet all your old friends there and make a lot of new ones.

THE ILLINOIS HIGH SCHOOL CONFERENCE.

The annual Illinois High School Conference was held at the University of Illinois November 18, 19 and 20. The Manual Arts section was probably the largest in the history of the Conference, numbering approximately one hundred and twenty-five.

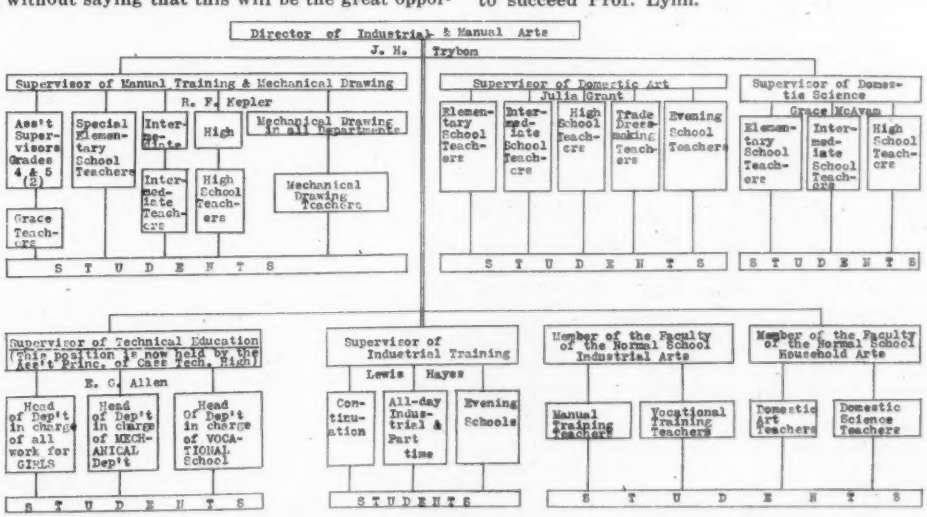
The principal discussions on the main program were "Curriculum Reconstruction," by Mr. Arnold Lau, Principal of the High School, Rock Island, Ill.; "Productive Work in the Manual Training Shop," by Mr. R. L. F. Biesemeier, Kenilworth, Ill.; "Relation of Art and Manual Training Courses," by Mr. L. A. Tuggle, Danville, Ill.; "Libraries for Manual Arts Teachers," by Mr. C. H. Dalton, Lovington, Ill., and "Continuation Work and Its Relation to Manual Arts," by Mr. S. J. Vaughn, University of Illinois.

An afternoon session, presided over by Mr. Vaughn, was given up wholly to a round table discussion of the newer phases of industrial and vocational education. The art teachers met at the same time for a round table discussion of their particular problems. Professor E. J. Lake of the University of Illinois conducted the round table.

A most encouraging phase of the general meetings of the entire Conference was the emphasis, both in point of time and in interest, which was placed upon the problems connected with the part-time school work in Illinois. School people have apparently just begun to realize the magnitude of the problem which the part-time work presents and they manifested great earnestness in seeking information and guidance at this Conference.

Mr. J. V. Lynn, formerly Supervisor of Trade and Industrial Education with the State Board, goes to Iowa State College as Associate Professor in the Department of Vocational Education, and will organize the new program.

Mr. Harvey L. Freeland of the East High School, Minneapolis, has been appointed State Supervisor in Iowa to succeed Prof. Lynn.



ORGANIZATION OF THE DETROIT INDUSTRIAL AND MANUAL ARTS DEPARTMENT.

The administrative and supervisory machinery of the Department of Industrial and Manual Arts of the Detroit city school system is made clear in the above chart. In the upper groups is included the older work of manual training, domestic arts and domestic science; in the lower groups are expressed the vocational and teacher training activities of the secondary, special and normal schools.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Textbooks.

133. Q:—Will you kindly advise me where I can get the textbooks on cabinet making, together with their prices, which are mentioned in your article "Reconstruction Courses" on Page 446 of the November issue of the Industrial-Arts Magazine?—*H. L. P.*

A:—The several books mentioned in Mr. Miller's article in the November issue of the magazine may be obtained as follows: *Wood Carving*, Thos. C. Simmonds, $0.50, Manual Arts Press, Peoria, Ill.; *The Hardwood Finisher*, F. T. Hodgson, $0.50, David McKay, Philadelphia, Pa.; *Furniture for the Craftsman*, P. D. Otter, $1.50, U. P. C. Book Co., New York City; *Effective English*, Claxton & McGinnis, $1.25, Allyn & Bacon, Boston; *Vocational Mathematics*, W. H. Dooley, $1, D. C. Heath & Co., Boston; *Furniture Designing and Drafting*, A. C. Nye, $2, Wm. T. Comstock Co., New York City; *Shopwork*, Rush-Conway, $1.20, Industrial Book & Equipment Co., Indianapolis, Ind.

Tin Can Toys.

134. Q:—Where can I find books on making toys from tin cans?.—*G. G. H.*

A:—*Thatcher's Making of Tin Can Toys*, $1.50. Lippincott Co., Philadelphia; *Williams' Tin Can Toys and How to Make Them*, $2.50. C. Williams Co., 5454 Page Ave., St. Louis, Mo.

Wood Carrying Texts.

139. Q:— Please inform me where I can obtain books and magazines on wood carving.—*R. R. V. S.*

A:—*Woodsend's Practical Wood Carving*, $1, U. P. C. Book Co., New York; *Rowe's Practical Wood Carving*, $3, Manual Arts Press, Peoria, Ill.; *Hodgson's Wood Carving*, $1, Building Age Book Dept., New York; *Jack's Wood Carving*, $1.40, D. Appleton Co., New York; *Simmonds' Wood Carving*, $0.50, Manual Arts Press; *Hodgson's Easy Lessons in Wood Carving*, $1.50, Periodical Publishing Co., Grand Rapids, Mich.; *Jackson's Wood Carving*, $1.20, Chas. Scribner, New York; *Moller's Wood Carving Designs*, $2.50, American Architect, New York.

NEW BOOKS.

Furniture for Small Houses.

By Percy A. Wells, head of the cabinet department, Shoreditch Technical Institute (England). Cloth, royal octavo. E. P. Dutton & Co., New York, N. Y.

This book presents a series of very simple, well-designed pieces of furniture intended for the small house occupied by the family of limited means. While many of the articles are just a trifle quaint from the standpoint of the United States, they are all very practical and can be made by any boy of high school age. In fact, the designs were developed and a full set of the pieces as suggested, was made in the cabinet shop of the London school with which the author is connected.

Technique of Practical Drawing.

Edward S. Pilsworth. Cloth, 12mo., 150 pages. The Macmillan Co., New York.

This book presents in simple, direct form the technique of drawing for reproduction by the photo-engraving process. The text does not enter at all into such important elements of drawing as design, perspective, etc., but limits itself strictly to the mechanics of drawing with the pencil, with the pen and with the brush. In the introductory chapter the nature and value of commercial art and the elements of representing form are explained. Each of the subsequent chapters takes up in detail the materials and tools, the delineation of outlines, shadows, and the other details of the correct and effective use of pencil, pen, crayon, and brush. Much practical information is given concerning well established methods, or "tricks of the trade," the methods of zinc and half-tone photo-engraving, the making of silver prints, special requirements in drawing for block-out and vignetted cuts, etc.

The book is especially valuable for school use because it brings together much information on commercial art practice which the average teacher overlooks entirely, or at least makes light of, in teaching the elements of drawing. The book is simply but amply illustrated.

Toy Patterns.

Michael C. Dank. Portfolio, 10½x14". Manual Arts Press, Peoria, Ill.

The present portfolio contains twelve sheets of full-size patterns for nineteen different toys—mostly suitable for direct copying and reproduction, with the coping saw. The toys emphasize children's love for humor and interest in motion. They are suitable for reproduction in the school or the home shop and should find wide use.

Four of the sheets have appeared in the problems department of the Magazine.

Educational Toys.

Louis C. Peterson. Boards, royal octavo, 113 pages. The Manual Arts Press, Peoria, Ill.

This book presents a collection of most interesting toys made of thin wood with the coping saw. The collection is the cream of a great number of toys made in the Model Practice School, at the Illinois Normal University (Carbondale), and includes only toys which have been subjected to the test of (a) adaptability to child powers, (b) interest, (c) educational value, (d) correct light-wood construction, and (e) adaptability to ordinary school-shop conditions. The author has carefully outlined correct methods of using the coping saw and other small tools and has added to each of the working drawings directions for overcoming the especial difficulties of construction. Three toys in heavy wood are added at the end of the book.

PUBLICATIONS.

How Teachers May Use Publications on the Control of Diseases and Insect Enemies of the Home Garden. Alvin Dille. Circular No. 68, 1919, U. S. Department of Agriculture. The pamphlet discusses topics for study, illustrative material, practical exercises, and correlations.

Forestry Lessons on Home Woodlands. By Wilbur R. Mattoon and Alvin Dille. Bulletin No. 863, 1920, U. S. Department of Agriculture. The lessons in the pamphlet present the subject of farm forestry from the standpoint of the important local kinds of forest trees and their uses, the location of woodlands on the farm, the economic value to the farm, utilizing timber, protection and improvement, and the planting of young timber. It discusses forest trees and forest types, location and extent of woodlands, economic value of forest, products from the forest, use of timber, measuring and estimating, marketing, protecting the woods, improving the home forest by cutting, woodlands and farm management.

Lessons in Plant Production for Southern Schools. Prepared by E. H. Shinn, assistant in agricultural education. Bulletin No. 53, Series No. 6, 1920. Issued by the Federal Board of Vocational Education. The lessons in this bulletin are intended to be adapted to the seasonal, agricultural, and school conditions of the states represented in the southern region. It discusses the selection of the project, the weekly program, crops, home garden, soils, insects, orchard, weeds, farm accounts, roads, small fruits, forage, fertilizers, and management suggestions.

Army Lessons in English. Parts I, II, III, IV, V, VI and VII. Prepared by Garry C. Myers. Issued by the Recruit Educational Center, Camp Upton, N. Y. These volumes are intended to teach the recruit to speak, read and write good English and to become a good American citizen. The men are taught to express themselves and to state intelligently what America stands for and what the government offers her citizens.

The American toy making industries value their output this year at $80,000,000. The total sales will reach the sum of $100,000,000. It is believed that the competition manifested by Germany and Japan before the war, and likely to assert itself again in the near future, can be combatted successfully owing to the introduction of machinery and the economies effected in quantity production.

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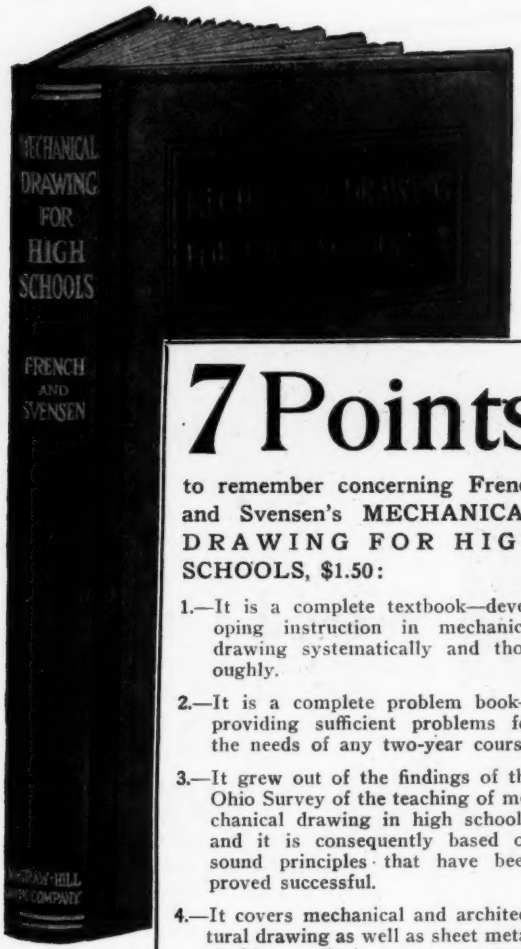

7 Points

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NEWS AND NOTES FROM THE FIELD.

Their First Trade School. Thru the agency of the Junior Red Cross, the American school children's branch of the Red Cross, Albania, which is that proud little country next door to Greece, will soon have its first trade school.

Miss Paraskevi Kyrias, who will act as instructor in the trade school, and will also serve as assistant to the Junior Red Cross director for Albania, sailed from New York a few weeks ago for Tirana, the capital of Albania, where the Junior Red Cross is operating a school of 200 pupils in which is being organized the first vocational training system ever attempted in that country. She is the first woman in that country to be awarded college degrees. Altho born in Albania, she was educated in Constantinople College for Women and after receiving her A.B., came to America and studied at Oberlin College, from which she was graduated with a degree of A.M. Before returning to Albania at the request of the Junior Red Cross her home was in Boston.

"Made in America." The refectory chairs and tables in a school at Poulers, a village about twelve miles northeast of Ypres in Belgium, which is attended daily by two hundred children, were all made in America by the boys of the Junior Red Cross.

Boston Has Record Enrollment in Industrial Courses. The trade and co-operative industrial classes of Boston, Mass., have this year registered 1,050 students. Of these, nearly 450 are in the Trade School, and nearly 600 in the co-operative classes of the general high school. A recently established course is that in automobile mechanics, which was begun at Brighton High School with an enrollment of thirty students. Eighteen of these students are hold-overs from last year and more than sixty are new entrants.

Building plans include three to four shops for boys in intermediate schools and workrooms and laboratories for girls. The Roger Walcott School will have shops for boys' work, and a household arts department for girls. The intermediate high school programs provide for mechanic arts courses for boys, and practical arts for girls, with seven hours of shop or laboratory work per week. In the Holmes District, the work has been enlarged from two to three elementary shops, with wood working, printing and electricity as subjects.

The Sloyd Training School, Boston, which was supported for the past thirty years by Mrs. Quincy A. Shaw, and which was last July voted out of existence by her heirs, has been taken over by the Alumni Association. The Association assumes the responsibility for the school this year and aims to find a means of continuing the work. The Boston School of Occupational Therapy which occupies the same building, assists in its maintenance.

Wisconsin teachers of vocational subjects met in Milwaukee on November 5, in connection with the Wisconsin Teachers' Association. The speakers included Messrs. John Callahan, Clyde A. Bowman, L. D. Harvey, R. L. Cooley, R. G. Smith. Mr. John B. Coleman of La Crosse presided.

Mr. Paul W. Monohan, formerly director of the State Vocational Department of Maine, has accepted the principalship of the high school at Rumford, Me.

Mr. T. T. Lindsey has become assistant professor in the Industrial Arts Department of Peabody College for teachers. During the past two years Mr. Lindsey served on the summer school faculty. He spent the scholastic year of 1919-1920 in post-graduate work at Bradley Institute.

Exhibit of Drawings by High School Pupils. Bangor, Me., recently held an exhibit in the windows of one of the local stores, of drawings made under the supervision of Miss Ethel C. Pfaff. The drawings were grouped about two commercial illustrative advertisements which were made by two of the pupils. One of the advertisements, which represented a fine Franklin car standing before an opera house, has been sold to the Franklin Motor Car Co., and the other, also an original, has been sold to Edwin O. Hall.

Evening Industrial School. Beverly, Mass., has opened an evening industrial school with classes for women in sewing, millinery, home care of the sick and reading of blue prints for those employed at machinery plants. Men will be instructed in drafting, tool making, machinery, electrical work, pattern making, chauffering, plumbing,

(*Continued on Page* XXIV)

Teaching The Trade-Learners

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"Choose the proper tools" would apply to most.

You cannot over-emphasize this point with students. Get them to recognize that the best work can best be done by good tools.

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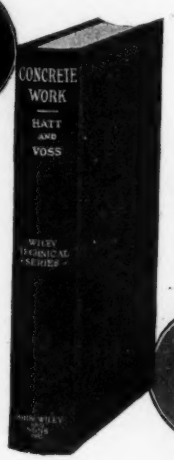
W. K. Hatt



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(*Continued from Page* XXII)

carpenter work and stationary engineering. The school is open to any resident of Massachusetts over 16 years of age.

Repair Football Clothing. The students of the household arts crafts at the Clinton, Mass., high school have been put to work darning stockings and mending articles of clothing worn by the football team, which means the saving of quite a little money for the athletic association.

New Vocational Study in Schools. The State Department of Education of Pennsylvania has made a determined effort to revise and arrange the course of the vocational industrial schools so they will be based on the dominant needs of the community in which they are situated. Eight new vocational schools of three types have been opened in different cities of the state. There are 30 all-day schools or a department of the existing high school, eight part-time trade schools, and 28 evening industrial schools. The day schools have an attendance of 1,400 boys and 300 girls and are of a type similar to the Philadelphia Trade School for Girls.

New Division of Education Department. A new division of the State Department of Education of Albany, N. Y., called the Division of Vocational and Extension Education has been formed. This division, which will have the powers and exercise the functions of the division of agricultural and industrial education, will have general supervision of the work of the department relating to extension education, including the development of special extension courses thru co-operation with universities, colleges and institutions of less than college grade. It will have the organization and supervision of evening schools, home classes, factory classes and afternoon classes; the Americanization work and educational work among foreign and native born illiterates and other extension activities. The division will also be in charge of rehabilitation activities provided for under the state and federal acts, including the advisement, training, placement and follow-up work of disabled persons who apply for vocational training.

Founds Vocational School. Harriet B. Clough of Gloucester, Mass., who died on October 7th left to the city of Gloucester the sum of $10,000, which money is to be held in trust as the Elias Mountford Clough Fund until it accumulates to $100,000, when the income is to be used to establish a school for vocational training. The will provides that the school shall be under the supervision of the School Committee of Gloucester.

Night Classes Well Attended. Wabash, Ind., has opened its night school vocational training classes with the largest attendance yet recorded. The largest class enrollments have been in practical mathematics, home electricity, elementary and advanced mechanical drawing, housewifery, interior decoration, sewing, cookery, study of fabrics, clothing repair and millinery.

Vocational Education Courses in Idaho. Idaho, altho one of the smallest states in the union in population, occupies a leading place among the states of the entire West in the amount and quality of its vocational work. There are 30 high schools in Idaho conducting Smith-Hughes work in agriculture, 20 already designated and 30 more applying for designation as Smith-Hughes schools in vocational economics, and there are indications that more than 30 trade schools and classes will be conducted this year.

Vocational Teachers' Class. A class in vocational training for all vocational teachers and all prospective teachers in Evansville, Ind., has been started at the manual training building. Mr. E. H. Edgerton of the state university vocational department of Bloomington, Ind., will be the instructor.

Rehabilitation Program to be Started. The rehabilitation program by which the State of New York will return to useful lives civilians permanently injured will be started immediately under a plan approved by Governor Smith and authorized by a new law. The plan calls for close co-operation between the State Education Department and the Industrial Commission. The commission will report to the education department the name and address of every person injured seriously and will assist in developing the retraining program. The sum of $75,000 has been appropriated for the work and the state will get an additional $75,000 from the Federal Government under an act providing federal aid for this type of work among the

(*Continued on Page* XXVII)

(*Continued from Page* XXIV)

states. It is estimated that there are 700,000 accidents in the state of New York each year, one-half of which are industrial.

Want Manual High Changed to Technical High. The faculty of the Manual Training High School at Peoria, Ill., has requested the school board to transform the manual training high school into a technical high school similar to the Lane Technical High School in Chicago. They ask that a new building be erected and that the building now in use be used for a continuation school.

New Classes Formed. Vocational classes for women have been organized in the Cunningham and Acipco, Ala., schools, under the direction of the board of education. Up to the present time vocational work has been provided only for men. There will be classes in sewing, cooking and home nursing. State, federal and city funds are used to carry on this work.

State Vocational Dinner. During the Missouri State Teachers' Association held at Kansas City, November 11, 12 and 13, the Vocational teachers of the state held a dinner. This dinner was attended by Manual Training Teachers and all others interested in Vocational Education. The food was prepared and served by the Vocational Classes of the Jane Hayes-Gates Institute.

After the dinner the speeches were made by some of Missouri's leading educators, including W. T. Carrington, state director of vocational education; Dr. Waters, of the Kansas City Weekly Star, formerly the President of the Kansas State Agricultural College at Manhattan, Kans.; Miss Standley, of the Economics Department of Missouri University; L. W. Rader of St. Louis, assistant superintendent of schools, St. Louis, Mo.; Mr. Louis Gustafson, Principal of Rankin Trade School, and U. W. Lamkin, national director of vocation education, Washington, D. C.

Sectional Meeting at the Missouri State Teachers' Association. Thursday, November 11, there was held at the Manual Training High School of Kansas City, Mo., a sectional meeting of the Vocational and Manual Training Teachers of the state. The speakers were Mr. Gustafson, principal of the Rankin Trade School of St. Louis; Mr. L. W. Rader, Assistant Superintendent of Schools in St. Louis; Mr. Cushman, principal of the Lathrop Trade School of Kansas City; Mr. M. G. Burton, Director of Vocational Education in Kansas City. Mr. Rader spoke on "Practical Examples of Vocational Guidance." Mr. Burton talked about the pre-vocational training of workers as a better way than the training of the worker for a particular job after the job had been taken. Mr. Cushman's speech was on the value of "Job Analysis" to vocational educators and vocational education. Mr. Gustafson read a paper for a missing speaker which as far as we could make out was trying to define "Manual Training and Vocational Education." Out of these speeches and papers a very lively discussion arose as to whether there was to be a swallowing up of Manual Training by Vocational Education or that Manual Training was to still hold a place in the school as a cultural subject.

Evening Millinery Classes Conducted. Evening classes in millinery have been established at Jefferson City, Mo. Two classes of 25 women have completed the work, and a third class has been formed. The work is popular and meets a great demand on the part of the women of the city.

An enrollment of sixteen boys has been obtained for the high school course in building trades. The course is given under the provisions of the Smith-Hughes law.

Seattle Part-time Schools. Seattle is the first city in Washington to take advantage of the new state law which makes it possible for boys and girls under 18 to accept employment and to carry on their education at the same time.

The courses, which provide four hours of instruction each week, offer two kinds of work, namely, vocational and general. The vocational instruction is determined largely by the individual needs of the student with the idea of making him more efficient in his particular line of work, or of preparing him for some occupation he desires to enter.

The courses have been based largely upon the findings of the survey made last year, and they are subject to change as the future needs demand.

Seattle's Industries Studied. A recent report of the Federal Board of Vocational Education on a study made of commercial occupations in nineteen cities of fourteen

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different states, contains an account of the survey conducted in Seattle during the Christmas holidays last year. The report is based on a canvass made of 303 different commercial and industrial establishments and on the followups made of 86 boys and girls under 18 years employed in these establishments. The numbers given for Seattle exceed those for any other city in the survey.

According to the report, boys and girls were found working at 28 different jobs. While it was assumed that certain positions would stand out as having more or less of a hold on promotional opportunity, the figures indicated that individual ability plays as large a part in advancement as does the character of the position held.

It is shown that a capable boy or girl may secure promotion by rendering superior service in any position, however humble it may be.

The information obtained thru the survey forms a basis for planning more wisely the courses for the continuation schools. It emphasizes, however, that only a part of the continuation school work should be vocational.

The School of Applied Arts of the Tide Over League of Boston, Mass., offers a thoro training to persons who would become teachers in the handicrafts in schools, summer camps and hospitals. Instruction is given individually or to small groups of students by experienced teachers. Courses may be taken intensively or slowly, schedules of hours being made out for full time, 30 hours per week, or for part time. Subjects taught are weaving, woodwork, French leather work, basketry, colonial rug work. Normal courses in occupational therapy are taught and lectures on the medical aspects of the work will be given by Harry C. Low, M.D.

The Washington School, Cincinnati, O., in its seventh eighth and ninth grades, emphasizes certain kinds of vocational work. The vocational courses are intended for boys and girls who cannot remain in school longer than the ninth year. They represent a complete unit of work and provide immediate preparation for the work a boy or girl is to follow.

The courses which fall within the requirements of the Smith-Hughes law provide for half-time in the shops for all boys. Fifteen hours of shopwork per week are given, with the remainder of the time devoted to related and academic subjects. Boys are encouraged to take the course in the seventh grade in order that they may have a varied experience in each shop before making a choice of a trade.

The school has fully equipped shops for woodwork, printing, electrical and sheet metal work. Each shop is in charge of a man who is a practical tradesman in his particular work.

Meeting of School Crafts Club. The School Crafts Club of New York City held the first regular meeting of the season on November 20th, at the Ethical Culture School. President R. A. Beyer presided.

Mr. M. F. Seeley, manual training instructor at Jersey City, N. J., and Mr. A. H. Miller of Teachers College, New York, were proposed for membership in the club. Dr. Arthur D. Dean spoke to the members on the subject, "A Hypothesis of Life."

The officers chosen are as follows:

President, Richard A. Beyer, Hoboken, N. J.; Vice-President, Martin J. Corcoran, Elizabeth, N. J.; Secretary, Philip M. Wagner, Newark. N. J.; Treasurer, Mr. Edwin F. Judd, Montclair, N. J.

The next meeting will take the form of a Round Table.

New Mechanic Arts Building. A new mechanic arts building which will accommodate 200 boys and cost about $20,000 has been completed at the South Coche High School, Hyrum, Utah, with new courses in blacksmithing, farm machinery and auto mechanics.

New Equipment Installed. Complete woodworking equipment has been installed in the Junior High School and High School of Mahanoy City, Pa.

Wins Prize for Window Display. William H. Tourtellote, a junior student at the Bartlett High School, Webster, Mass., recently won a prize of $150 for a window display made by him and entered in a national contest.. The design drew the second prize, the first one going to a Japanese artist. Mr. Tourtellote has also done other art work in the form of a cover for the school report, and special designs for school needs.

(Continued on Page XXXI)

(*Continued from Page* XXVIII)

Colorado Arts and Crafts Meeting. The Arts and Crafts Section of the Western Colorado Association met on November 5th, at Gunnison.

At the business session, the following officers were elected: President, O. L. Hargrove, Gunnison; Vice-President, Paul Wright, Delta; Secretary, C. R. Walker, Gunnison.

Convention of the Minnesota Manual Arts and Vocational Teachers. A general session of interest to industrial and household arts teachers was held November 3 to 6, at St. Paul, during the convention of the Minnesota Educational Association. Industrial education for general education purposes, Smith-Hughes classes, junior high schools and girls' vocational work were among the subjects discussed. Prof. Homer J. Smith, University of Minnesota, was elected president; Miss Marie Henegren, vice-president, and Mr. L. F. Knowles secretary.

At the manual training meetings some helpful addresses on personality in the industrial teacher, keeping up with the times in the manual arts and trades classes, were delivered. Mr. J. E. Painter, Minneapolis, was elected president, and Mr. John F. Friese, St. Cloud, secretary.

At the second annual conference on vocational education, which took place during the convention, the proposed compulsory part-time and evening school laws were discussed. Among the speakers were Prof. Ira S. Griffith, University of Wisconsin; Dr. C. A. Prosser, Dunwoody Institute, Minneapolis; Prof. George M. Brace, St. Paul; Prof. Arthur F. Payne, Prof. Homer J. Smith, and Prof. Leonard V. Koos, University of Minnesota; Supt. B. B. Jackson, Minneapolis; Supt. W. A. Ziegler, Thief River Falls; Miss Elizabeth Fish, Minneapolis; Prof. Arthur E. Holder and L. S. Hawkins, Federal Board of Vocational Education; F. H. Thomas, St. Paul Industrial School, and H. M. Brook, Central High School. Minneapolis.—*J. F. Friese.*

Continuation School Opened. A continuation school has been opened at Marlboro, Mass. The school which is meeting with general approval, has an enrollment of 90 boys and 75 girls.

Agricultural Department Established. A four-year course in agriculture has been inaugurated at Mt. Vernon, Ohio, with a Smith-Hughes director in charge.

Mechanical Drawing and Blue Printing Class Continued. The evening classes in vocational mechanical drawing and blue print reading conducted last year, have been resumed for the present winter. The work is in two divisions, one of which is composed of men from the Herreshoff Manufacturing Company. The other offers work which is more general in character.

Continuation School Established. A continuation school has been established at Webster, Mass. The pupils who attend four hours per week, are given instruction in cooking, sewing, millinery, printing, woodworking, business practice and academic subjects. The girls' time is divided between household arts and academic subjects, and the boys between manual training and academic subjects.

Increased Enrollment at Stout. The enrollment at Stout Institute, Menomonie, Wis., this year shows an increase of 35 per cent in home economics and 52 per cent in industrial arts. A total of 406 students are in attendance at the school, and the mid-year enrollment is expected to materially increase the figures. A large number of students who have qualified under the Smith-Hughes law are taking the regular courses. In addition, there is a scholarship group, selected by the State Vocational Board as qualified to pursue an intensive teacher-training course of two years. They are being trained especially for vocational school work in trade and industrial subjects, and in vocational home economics.

An Exhibit of Craft and Commercial Art Work. An exhibit of crafts and commercial art was held November 17-19, at Buffalo, N. Y. The exhibit was displayed in the Technical High School and included material arranged in two groups. The first included the crafts of wood blocking, batik decoration, parchment shades, table runners, collar and cuff sets, blouses, smocks, sport hats and scarfs. The second comprised such commercial art work as lettering, letter heads, folders, booklets, posters, cards, menu, place and score cards, book plates and trademarks. The work which was all done by the students, was offered for sale to the public.

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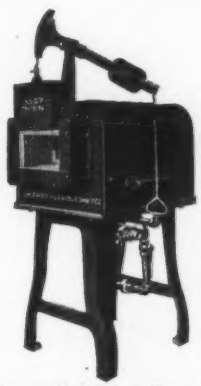

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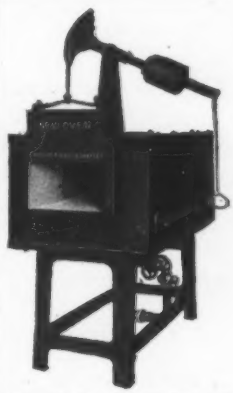

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Maine Home Economics Teachers Meet. The Home Economics Section of the Maine Teachers' Association met on October 29, at Bangor, Me. Prof. Frances R. Freeman, University of Maine, acted as chairman.

At the meeting, Miss Bernardine Cooney, State Supervisor, discussed the Fess Bill; Genevieve Fisher, Federal Agent, Washington, D. C., took for her subject "The Project in Teaching Home Economics;" Mildred Beatham talked on "Some Phases of Teaching the Budget," and Esther McGinnis considered the "Undernourished Child and the Nutrition Class."

Form Occupational Therapy Association. Representatives of Walter Reed, Mount Alto and St. Elizabeth's Hospitals, Washington, D. C., in co-operation with the Federal Board of Vocational Education, have formed a local association of occupational therapy. The association aims to promote the work not only among tuberculous and mental cases, but among orthopedic, paralytic, nerve and general cases. Miss Tracy, of St. Elizabeth's Hospital, is recording secretary.

IN AND ABOUT BOSTON.

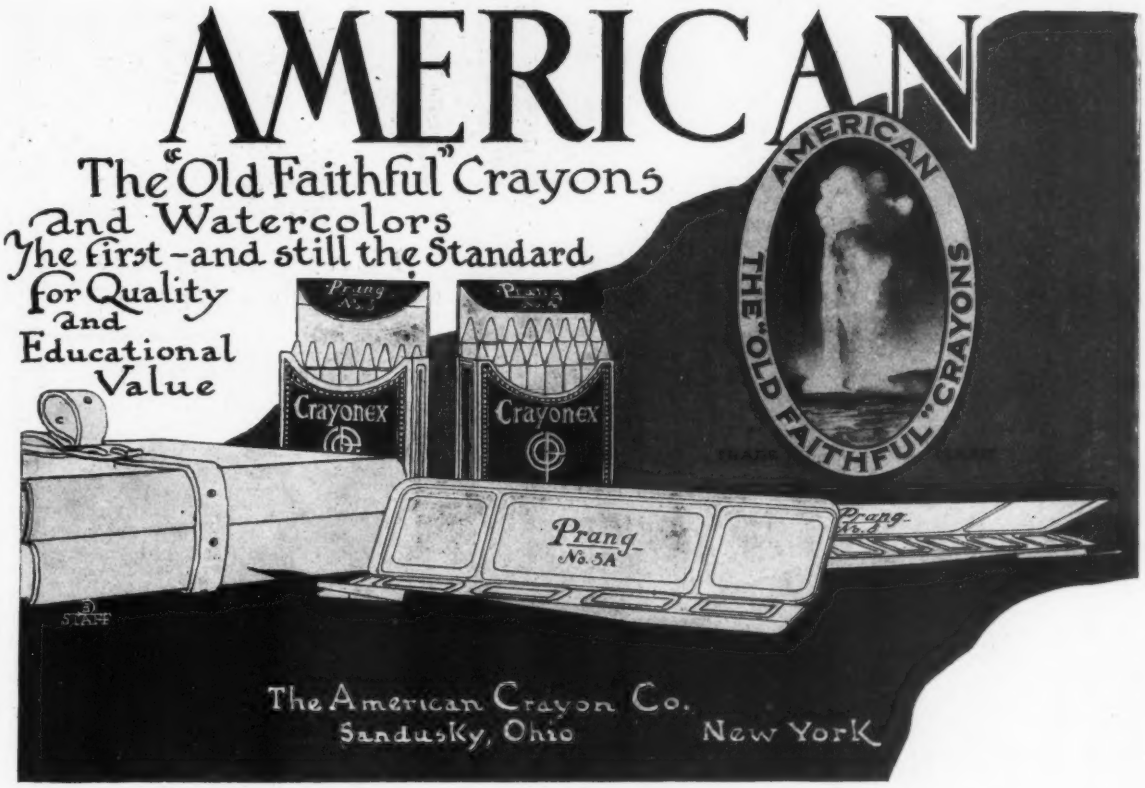
The October meeting of the Boston Manual Training Club was held on Saturday, the 13th, at Healy's Hotel. It was a luncheon meeting such as has proved of great popularity during the past few years. The speakers of the afternoon were S. S. Booth of the Alexander Hamilton Institute, and R. R. Cunningham of the La Salle Extension University, who spoke on "The Advantages of Extension Education."

Mr. Booth's talk dealt with the subject impartially without any special emphasis on the institution he represents, while Mr. Cunningham gave a more detailed account of the methods used by the La Salle Extension University.

Mr. Booth cited many instances where the only means of education which those in certain positions have is by correspondence courses. He emphasized the value of one being able to choose his own time and place to study, as the extension school methods allow a student to take advantage of odd moments for application to lessons. In comparison with school attendance courses the correspondence courses have many advantages. An individual can progress as rapidly as his ability allows in the correspondence course, while in the "attendance school" the pace of the group is determined generally by the work of the poorer students. Mr. Booth explained how it was possible for the extension schools to have at their command the services of a large force of experts in almost all branches of endeavor. This is because of the low overhead costs and consequently large profits from tuitions. He cited an example where it was possible for him to supply a business president data for the solution of a troublesome problem in the short time of two hours. Only through the services of a corps of experts constantly accessible could such special problems be so quickly solved. The large variety of subjects, especially in business lines, was another point which Mr. Booth made. In closing he emphasized the fact that any course of instruction is of value only in proportion to the effort put into it by the student.

Mr. Cunningham began his talk by pointing out that extension education cannot and never will take the place of residence courses. However, it has a most important place in education. He told of the dependence of the extension schools upon the established universities, as a large part of the faculty of extension schools are men prominently connected with the big colleges. Mr. Cunningham gave some interesting statistics in connection with the La Salle Extension University. The financial resources are over $5,000,000. There are over 600 on the educational and administrative staff; over 450 consulting experts and text writers; over 200 field counsellors. There are over 230,000 men and women students and graduates ranging in age from 18 to 60 years. The annual earnings which the university has added to the students' incomes is estimated at more than $100,000,000.

Much has been said about the small percentage of graduates from the correspondence courses compared with the number who enroll. Mr. Cunningham was able to show this to be much larger than in the case of those who enter resident schools of a collegiate grade. He described the Problem Method of Instruction as carried on by La Salle.



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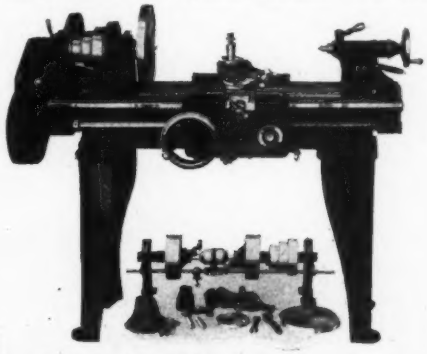
The new lathes are now identical in design, except for size, with the larger manufacturing lathes made by the firm. They are equipped with automatic longitudinal feed, automatic cross-feed and compound rest, and are especially suitable for very accurate small work. The bed is especially rigid and the head and tail stocks are of the newest improved type made for the larger machines. The lathes are indexed to cut standard threads and a large number of special threads. The compound



rest is graduated in 180 degrees and the cross-feed screw has a micrometer graduated collar with readings in one-thousandths of an inch.

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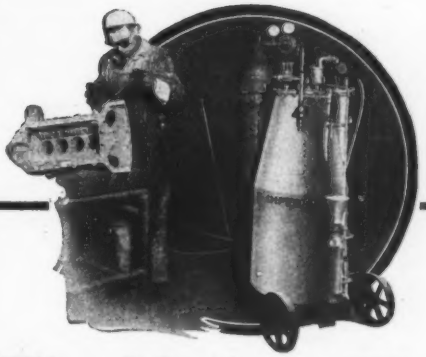

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The work in the book has been so developed that the general sequence is constant with the vocational problems, and it is so graded that the arithmetical side of each problem is developed before it is actually reached in the trade practice.

The material presented is sufficient for a two years' course and the book is conveniently divided into four parts as follows: Part I—Fundamentals and Common Fractions; Part II—Decimal Fractions, Trade and Domestic Science Problems; Part III—Percentage, Ratio and Proportion, and Carpeting Problems; Part IV—Home Maker's Problems.

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A complete school manual and guide for the making, finishing and setting of birdhouses. Illustrated with numerous photographs and with working drawings for shelters for the wild birds common to the United States.

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American School Toys

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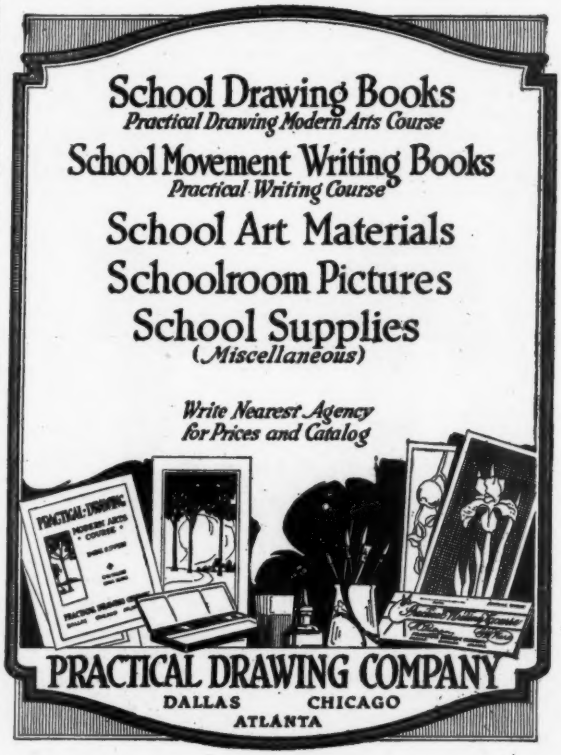
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